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ABSTRACT

This publication is part of a series that reprints articles on a range of thematic issues published in the "Canadian Journal of Higher Education." This collection focuses on gender equity in Canada's postsecondary educational institutions (for both students and teachers). After a preface and an introduction, the five articles are: "Is the Postsecondary Classroom a Chilly One for Women? A Review of the Literature" (XX:3, 1990) (Dana Williams); "Gender Issues in University: The University as Employer of Academic and Nonacademic Women and Men" (XXIII:2, 1993) (E.-Dianne Looker); "Detecting Gender Discrimination in University Salaries: A Case Study" (XXII:1, 1992) (Leora C. Swartzman, Clive Seligman, and William J. McClelland); "What Should the Goals Be? Employment Equity for Female Faculty in Canada" (XIX:1, 1989) (John H. Blakely); and "An Evaluation of Pay Equity Reports at Five Canadian Universities" (XXIV:2, 1994) (James M. Dean and Rodney A. Clifton). (Individual articles contain references.) (SM)

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CENTRE FOR HIGHER EDUCATION RESEARCH AND DEVELOPMENT

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CHERD/CSSHE
READER SERIES
Number 3

GENDER EQUITY IN CANADIAN POSTSECONDARY EDUCATIONAL INSTITUTIONS

CHERD/CSSHE
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GENDER EQUITY IN CANADIAN POSTSECONDARY EDUCATIONAL INSTITUTIONS

Edited by

Rodney A. Clifton, Lance W. Roberts, and Raymond P. Perry
Centre for Higher Education Research and Development
University of Manitoba

Series Editor

Alexander D. Gregor
Centre for Higher Education Research and Development
The University of Manitoba
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GENDER EQUITY IN CANADIAN POSTSECONDARY EDUCATIONAL INSTITUTIONS

Table of Contents

Preface 1

Introduction 3

Articles (taken from *The Canadian Journal of Higher Education)*

Dana Williams (1990)
Is the Postsecondary Classroom a Chilly One for Women. A Review of the Literature. XX:3 7

E. Dianne Looker (1993)
Gender Issues in University: The University as Employer of Academic and Nonacademic Women and Men. XXIII:2 21

Leora C. Swartzman, Clive Seligman, & William J. McClelland (1992)
Detecting Gender Discrimination in University Salaries: A Case Study. XXII:1 45

John H. Blakely (1989)
What Should the Goals Be? Employment Equity for Female Faculty in Canada. XIX:1 57

James M. Dean & Rodney A. Clifton (1994)
An Evaluation of Pay Equity Reports at Five Canadian Universities. XXIV:2 79

Preface

The *CHERD/CSSHE Readers Series* represents a collaborative partnership of the Centre for Higher Education Research and Development and the Canadian Society for the Study of Higher Education. The series is intended to bring together the best articles that have been published in the *Canadian Journal of Higher Education*, in a range of thematic issues. It is hoped that the collection will provide a useful basis for the systematic examination of those issues, on the part of both researchers and practitioners; and that they will stimulate further investigation in those critically important areas of scholarship and practice.

Alexander D. Gregor

General Editor

Introduction

Equality is a fundamental principle supported by all modern democratic nations. In Canada, Section 15 of the Charter of Rights and Freedoms proclaims: "Every individual is equal before and under the law and has the right to the equal protection and equal benefit of the law without discrimination and, in particular, without discrimination based on race, national or ethnic origin, colour, religion, sex, age or mental or physical disability." These rights, of course, complement other rights that are enshrined in both federal and provincial legislation.

Such constitutional proclamations about equality express ideals intended to inspire conduct in desirable directions. The importance attached to such legislation indicates that social reality may differ substantially from such ideals. Because of the disparity between the ideals of social justice and common practices in organizational life, legislators have passed specific legislation aimed at achieving equity in employment opportunities and salaries for various target groups. Females are one of these target groups. In Ontario, for example, the Pay Equity Act (Bill 154) ensures that both genders receive equal payment for work of equal value. This act also ensures that universities, as important public institutions, treat males and females fairly.

Despite these public policy initiatives to ensure gender equity, female students and faculty report that they experience discrimination. Recent reports about the University of British Columbia, the University of Manitoba, the University of Victoria, and York University all illustrate that the academic environment for females is a "chilly climate" where prejudice and discrimination are common. Moreover, at many Canadian universities female academics have successfully argued that salary adjustments are required to compensate them for inequalities resulting from institutional discrimination. Such evidence of unjust social and economic treatment toward females underscores that gender equity is an issue that continues to require the attention of university administrators.

The articles in this collection explore several topics relevant to understanding the program and policy debates regarding gender equity in Canadian universities. Dana Williams reviews the existing literature on gender-bias in post-secondary classrooms. Although she indicates that many important issues remain to be researched, several gender disparities

can be identified. These include the facts that female students participate less in classroom discussions than males; that female instructors and professors who have received training about gender equity positively affect female students participation; and that a supportive educational environment encourages the self confidence and academic achievement of females. Identification of these social facts about post-secondary classrooms indicates the need to think seriously about gender equity issues in university classrooms.

Gender based inequalities are not restricted to university classrooms, as the cases studies reported by Dianne Looker and Leora Swartzman et al. make clear. Both these articles examine disparities between male and females staff and faculty at universities. Professor Looker examines the situation for both academic and non-academic employees at a small university in Atlantic Canada. Her research reveals that female employees are less likely to hold full-time and prestigious positions. Moreover, they are more likely to be underpaid for work of equal value and to report experiences of discrimination and sexual harassment. The issue of discrimination in academics' salaries is the focus of the case study of faculty in a large Canadian university by Leora Swartzman and her colleagues. The findings of this study suggest that, when other factors are taken into account, promotion and salaries are not affected by the gender of employees. In other words, there is little gender-based discrimination for academics.

Competing positions about the character and extent of unjust treatment toward female academics complicates the task of generating and implementing employment equity policies. Nonetheless, John Blakely takes up the task, illustrating how the development of goals for such policies need to be conditioned by considerations of labour supply, demand, and fairness. Although the 1985 data used to make his estimates need updating, the methodology Professor Blakely proposes provides a useful model for structuring realistic employment equity policies.

The final paper in this collection, by J. Dean and R. Clifton, also focuses on methodology, specifically on the means of measuring the degree of salary discrimination between female and male academics. After reviewing the procedures used in five Canadian universities, the authors conclude that, although it is apparent that salary discrimination exists, the quality of the data and models used to determine salary discrimination are prone to overestimating the amount of discrimination which may have resulted in unfairly distributing salary adjustments.

The five papers in this collection are representative of the scope and character of scholarly research into gender equity in Canadian universities. Beyond the substantive significance of the articles themselves, this collection illustrates some broader points about the relationship between academic research (knowing) and policy development (doing), regarding the issue of gender equity.

The knowing-doing relationship is highly variable. Some people advocate gathering knowledge "for its own sake" (knowing without doing); other people claim that if you wait for all the relevant data, nothing will get done (doing without knowing); while still

others believe that policy development should be informed by gathering the best data available within the limits of the resources and then developing social policies (knowledgeable doing). The latter is our position, and from this position some observations about gender equity research in post-secondary educational institutions can be made.

First, it is clear that additional research needs to be done for informed policy development to occur in universities. Despite the general quality of the reported research, the findings address narrow (yet important) questions and rely on small samples from which it is difficult to generalize. Moreover, there are so few studies on this issue that drawing reliable and valid conclusions is problematic. This limitation indicates that often gender equity policies are not theoretically informed nor are they rooted in rigorously developed empirical data.

Second, universities are supposed to be centres of critical thinking and research excellence. Accordingly, when these institutions are challenged to reduce gender inequity, their responses should be a model for other institutions to follow. As the papers in this collection suggest, however, the research is in the initial stages in order to forge both a logical and empirical connection between academic knowing and doing something about gender inequalities. We hope that this reader will encourage academics and students to think more clearly about gender discrimination and to conduct more research on this issue. In total, we hope that this work will lead to the development of social policies that are more efficient, effective, and just.

Is the Postsecondary Classroom a Chilly One for Women? A Review of the Literature

DANA WILLIAMS

Ryerson Polytechnical Institute

Abstract

A review of the literature on gender bias in the postsecondary classroom reveals that in many cases women students do not participate in class discussions as much as men students. Cause and effect cannot be determined from these studies, but a female teacher and teacher training in sex equitable behaviour are two factors associated with increased female participation. Studies examining student evaluations of teachers reveal that female students rate their female professors higher than their male professors. Research examining postsecondary experiences leading to women's achievement and self-confidence after graduation suggests that attending a woman's college and having female teachers are important. Future research is needed to determine the cause and effect relationship between specific classroom variables on women's classroom participation, satisfaction, and achievement after graduation.

Résumé

L'examen de la recherche traitant des differences entre les sexes dans les salles de classe du niveau postsecondaire révèle que, dans bien des cas, les étudiantes interviennent moins que les étudiants dans les discussions. Ces études ne permettent pas de determiner un rapport de cause à effet, mais semblent indiquer que la presence d'un professeur de sexe féminin, aussi bien qu'une formation des enseignant(e)s visant à obtenir un comportement équitable à l'égard des deux sexes, favorisent la participation des

étudiantes. Des études sur l'évaluation des enseignant(e)s par les étudiant(e)s montrent que les étudiantes donnent une meilleure cote aux enseignantes qu'aux enseignants. Les recherches portant sur les experiences du niveau postsecondaire qui encouragent le succès et la confiance en soi chez les diplômées suggèrent l'importance de facteurs tels que les collèges de femmes et la présence d'enseignantes dans les écoles. Il faudra poursuivre les recherches en vue d'établir un rapport de cause à effet entre des variables spécifiques rencontrées dans les salles de classe et qui ont des incidences sur la participation des femmes en classe, leur degré de satisfaction, et leur succès une fois leurs études terminées.

Is the postsecondary classroom climate a chilly one for women? Hall and Sandler (1982), in a report published as part of their work on the Project on the Status and Education of Women, assert that it is. Women and men in the same classroom may have very different experiences. In the majority of cases, this chilly climate is inadvertently communicated to students by their professors. These professors are probably not aware that they are communicating unexamined cultural beliefs that women are not as committed to their education as men, that they are not as smart, and that women's work is not as important as men's work.

Most factors contributing to a chilly climate are subtle; some are overt. A few of the many behaviours of professors listed by Hall and Sandler (1982) which may contribute to a chilly climate include: calling on men students more than women students, asking men more difficult questions, interrupting women students more than men students, making more eye contact with men students when asking questions, using sexist humour or making disparaging remarks about women, using examples where only the man is the professional, using the generic "he" or "man" to represent both men and women, and gearing lecture content to male interests and experiences while neglecting women's interests and experiences.

Hall and Sandler (1982) assert that women's experiences in the classroom may lead to low levels of self-confidence and to a feeling that they do not really belong. Their experiences may lead to a lack of participation in class discussions. Women's experiences may prevent them from seeking help outside of the class. Finally, their experiences may dampen their career aspirations and prevent them from majoring in non-traditional fields.

A large part of Hall and Sandler's (1982) evidence for a chilly classroom environment comes from personal reports from women attending universities. The purpose of this paper is (1) to determine the extent of the experimental evidence for gender bias in the postsecondary classroom, (2) to review research investigating factors which affect the classroom climate of women students, and (3) to discuss recommendations for future research.

EVIDENCE FOR GENDER BIAS

Studies Directly Examining Gender Bias.

There is not much research evidence that gender bias in the postsecondary classroom exists. Three studies examine sex differences in classroom interaction patterns, and two studies examine the effects of teacher training in sex equity on student attitudes and classroom interaction patterns. In none of these studies is there any proof that it is the teacher behaviours which are causing the student differences.

Sex Differences in Classroom Interaction Patterns

Karp and Yoels (1976) found that men students were involved in more classroom interactions than women students, especially in male-taught classes. In male-taught classes, men accounted for 75.4% of the interactions and women 24.6%, while in female-taught classes, men accounted for 57.8% of the interactions and women 42.2%. The rate of male-female participation did not appear to be a function of over-representation of males in male-taught classes because the percentage of male and female students was almost equal in both types of classes.

Sternglanz and Lyberger-Ficek's (1977) findings also indicate more male than female involvement in classroom interactions, especially in male-taught classes. When the teacher initiated an interaction, male students were involved in more classroom interactions than women students in male-taught science and nonscience classes; but the number of male and female interactions was proportionately the same in female-taught nonscience classes. No classroom observations were made in female-taught science classes. In most cases, but especially in male-taught classes, males also attempted to initiate disproportionately more of the interactions with the teacher than did females. They were more likely to raise their hands, make a statement, or ask a question. These researchers also noted that the findings did not seem to be due to an over-representation of males in the class because males tended to dominate all classroom interactions whether in the majority or minority.

Unlike the previous researchers, Boersma, Gay, Jones, Morrison, and Remick (1981) did not find any sex differences in student classroom interactions. They found no sex differences in question-asking, number of interactions, who was first to respond to a teacher's initiation, or in who interacted with a teacher just before or after class. Unlike the previous researchers, they did not find more sex-biased classroom interaction patterns in classes taught by males. They, in fact, found the opposite pattern, with males participating more than females in female-taught classes, and females participating more in male-taught than female-taught classes. Females were involved in proportionately more interactions than males in 52% of male-taught classes and in 29% of female-taught classes. Boersma et al. (1981) believe that their results are due to better methodology in that they directly matched their male and female professors on class topic, size of class, and class level.

Conflicting results concerning whether teachers differed in their behaviour toward male and female students were found by these researchers. Karp and Yoels (1976) found that male teachers directly questioned male more than female students, while female teachers were equally likely to question male and female students directly. Sternglanz and Lyberger-Ficek (1977), while not examining the number of direct questions to students, found no evidence for differential treatment of students by teachers on other variables. Teachers recognized almost every student's attempt to initiate an interaction and were equally likely to continue an interaction with a male or female student. When comparing teacher behaviour towards male and female students, Boersma et al. (1981) found no sex differences in number of interactions — initiating questions, direct questions, number of questions asked in response to students' comments, likelihood of responding to a student, or praise given in response to a student.

Further research is needed to assess what contributes to the sex differences in classroom interaction patterns in some samples and the lack of sex differences in other samples. Much more research is also needed to determine if male and female teachers differ in classroom behaviours not measured, and if these differences contribute to the sex differences in the students. Some variables to assess are: differential eye contact, smiling, and number of interruptions to male and female students. The content of a lecture may affect classroom interactions, with professors who use more female examples and professors who use more positive, high status female examples eliciting more interactions from the women in the class.

However, even if it can be demonstrated that certain teacher behaviours are associated with sex differences in classroom interaction patterns, this does not prove that it is the teacher behaviour which causes the differences. It may be that the sex differences cause the teacher behaviours; i.e., the lack of female response may lead teachers to establish eye contact and smile with males more than females.

The Effects of Teacher Training

Two studies examine the effects of teacher training in sex equity on teacher and student attitudes and classroom interaction patterns. They suggest that training teachers to pay equal attention to male and female students does decrease the sex differences in classroom interaction patterns, but that the introduction of content on women into courses may have detrimental results if not done properly.

Schmitz and Williams (1983) conducted a project to assess how teaching instructors about sex-biased teaching styles and helping them to integrate content on women into their courses affects teacher and student attitudes. A majority of instructors reported positive personal and professional changes as a result of their involvement in the project. Instructors also reported that they modified their language style in the classroom to avoid linguistic bias, paid more attention to nontraditional students in classroom discussions, and tried to place equal demands and expectations on all their students. However, no

observational studies were conducted to determine whether teacher behaviours did change or if they affected classroom interaction patterns.

Student reactions were mixed. Approximately half the instructors reported negative, hostile, or defensive reactions from their students, while the other half reported positive, serious, concerned discussions of sex equity issues. The faculty who elicited less hostility and greater sensitivity to issues of sex equity in their students were those who made no mention of the curriculum reform project, who carried on as if the new content was an established part of the course, and who presented the facts with a discussion of competing interpretations.

Long (1986) examined the effects of training college professors in sex equitable and effective interaction skills. An important shortcoming of the previous research reviewed is that there is a failure to demonstrate cause and effect. The present study comes closer to demonstrating that teacher behaviour causes sex differences in classroom interactions. There were fewer sex differences in classroom interaction patterns of teachers who were trained in sex equity than in the classrooms of teachers who were not given any training. This suggests that it may be the sex equitable behaviour of the teachers which produces the increased rate of response in the females.

Instructors in the experimental group took part in a Project EFFECT Faculty Development Workshop on Effectiveness and Equity in College Teaching. This was a 2 1/2 day workshop and one day follow-up session in which instructors were given training, practice, and feedback on sex equitable distribution of attention and precise and effective responses to students' questions and comments. Control group instructors were matched with those in the experimental group on the variables of gender, department, subject taught, and as closely as possible for rank and years of experience. Classes were matched as closely as possible on academic content and class size.

Results indicated proportionately more interactions with males in the control group classroom, with treatment classes near equity, with still a slight bias toward males. In the control classrooms, proportionately more males were salient (involved in at least 1/4 of the classroom interactions), and proportionately more females were silent. The proportion of silent and salient males and females reached equity in treatment classrooms.

While this study is important in that it demonstrated that teachers trained in sex equitable behaviour had more sex equitable classrooms, it is still a quasi experiment since subjects were not randomly assigned to groups. It may be that professors who volunteer to take part in a workshop to eliminate sex-biased classroom interactions are less likely to have those kinds of interactions in their classrooms in the first place. Long (1986) recommends that a true experiment using a pre-post experimental design be conducted to assess cause and effect, to assess whether teacher training causes the sex equitable classroom behaviour.

Anecdotal and Questionnaire Data

Two studies present anecdotal or questionnaire data on gender bias. One study addresses gender bias in one particular post graduate class, while the other study examines gender bias in a particular department in a college.

Frisbie (1980) examined undergraduate and graduate teacher education students' views about racism and sexism at Georgia Southwestern College. Of these students, 8.7% felt that they had been victims of sex discrimination while at Georgia Southwestern College, with more males than females feeling that they had been discriminated against (17% of males vs 7.3% of females). Of the students, 30.26% males and 20.12% of females indicated they had heard sexist comments by professors in the division of education. Since males were a distinct minority in the teacher education programs, this probably contributed to their experience of gender bias. This study illustrates that gender bias can also exist for males when they are in a minority in the classroom. One must also remember that some subtle forms of sex bias may go unrecognized by students and teachers, but at the same time have powerful effects on behaviour and attitude.

Lewis and Simon (1986) discuss their experiences as a female student and male professor, respectively, in a graduate seminar concerning the relationship between language and power. They report that the men in the class monopolized not only the speaking time but the theoretical and social agenda as well. The men students enjoyed a great camaraderie, while the women students were mostly silent spectators. Men spoke at length and were seldom interrupted. When a woman and man began speaking at the same time, the woman always deferred to the man. When a woman did speak, it was as if she had not said anything. What she said was reinterpreted by the men or was attributed in a later discussion by a man to a man.

The professor was aware of the male dominance in the class and unsuccessfully tried to facilitate participation by the women. The women in the class did not participate more fully until they as a group acknowledged to each other the social dynamics of the class and the lack of a feminine perspective taken on the issues that were being discussed. The format of this class was mostly discussion. This paper illustrates the increased difficulties in eliminating gender bias in a discussion format as compared to a lecture format class. In this case, not just the instructor, but all students, must be made aware of the social dynamics of the class. A male instructor, a male majority class, with a discussion format may be especially likely to alienate women students because of a lack of female perspective taken on the issues.

Studies Dealing with Related Issues

The following studies do not directly assess whether gender bias exists in the post-secondary classroom. They do, however, deal with issues concerning the classroom climate for women: the importance of female teachers for female students, the importance of nonsexist language, the importance of female content in textbooks and lectures, and factors which may facilitate greater participation and self-confidence in women students.

Student Evaluation of Teachers

The following four studies examine student evaluations of their teachers. Studies asking subjects to evaluate a hypothetical male or female teacher are not included.

Elmore and La Pointe (1975) found that female students rated female faculty as significantly more interested in students than male faculty. Male students rated male faculty significantly more interested than female students rated them, and female students rated female faculty significantly more interested than male students rated them.

Bray and Howard (1980) found female students reported significantly more progress in female teachers' classes than in male teachers' classes, and female students reported more progress than male students in female teachers' classes. Androgynous teachers, as measured by the Bem Sex Role Inventory, received higher satisfaction ratings than both masculine and feminine teachers.

Bennet (1982) found that female instructors are perceived by their students as warmer, more encouraging, less authoritarian, more efficacious, and more potent. Even though students reported receiving more time and personal attention from female instructors, they complained that their female instructors were not available enough. Bonnet suggested this might be due to male instructors actively discouraging student contact.

Rosenfeld and Jarrard (1985) found that perceived sexism in college professors makes an important contribution to students' perceptions of classroom climate. Professors in liked classes were perceived as less sexist than those in disliked classes, and male professors were perceived as more sexist than female professors. Perceived low sexist male professors' classes were distinguished from perceived high sexist ones as being higher in supportiveness, innovation, order, and organization and lower in defensiveness. Perceived sexism in female professors did not relate to classroom climate. The authors suggest that this may have been due to the small number of female faculty who were evaluated by the students (49 female-taught classes vs 145 male-taught classes), the lower level of perceived sexism of female faculty, or to the possibility that sexism in female professors might be countered by feminine supportive behaviours, such as smiling, which had not been investigated.

Sex Biased Language

There has been much research on the effects of sex biased language. The following two studies are samples of this research and indicate that the use of the generic "he" is not neutral and can lead to sex role stereotyping.

Moulton, Robinson and Elias (1978) asked male and female college students to make up a story creating a fictional character who fit one of the following two themes, with three conditions across each theme: "In a large co-educational institution, the average student will feel isolated in (his, their, his or her) introductory classes;" OR "Each person knows when (his, their, his or her) appearance is unattractive." Results indicated that

using male terms induces people to think of males even when these terms were used in their "neutral" sense. Combining both themes, in the "his" condition, 35% of the story characters were female, in the "their" condition, 46% were female, and in the "his or her" condition, 56% were female.

Briere and Lanktree (1983) showed that the use of the generic "he" could serve to bias subjects to greater sex role stereotyping. Undergraduate male and female students were given one of the three versions of the first paragraph of the 1972 APA "Ethical Standards of Psychologists:" (1) the uncorrected version, (2) a version where "he" was replaced by "he or she", and (3) a version where "he" was replaced by "she or he.".Subjects then rated psychology on its attractiveness as a future career for men and women as well as their willingness to refer a male friend and a female friend with a psychological problem to a psychologist.

Results indicated that subjects exposed exclusively to male nouns and pronouns rated a career in psychology as less attractive for women than subjects exposed to the two other conditions. Females were most willing to refer a male friend to a psychologist under the "she or he" condition and were more willing to refer a male friend under this version than were males. This study indicates that the use of "he or she" and "she or he" in the classroom may have powerful effects on the perceptions of students. If a teacher continually uses the generic "he" in the classroom, female students may be more likely to perceive that the teacher is only referring to males, may be less likely to perceive that the subject matter applies to females, may become less interested and less likely to take part in class discussions, and may become less involved in the academic life on campus.

Sex Bias in Course and Textbook Content

Research on the content of current textbooks used in Canadian universities reveals that much subject matter may be exclusively taught from a male point of view. For example, the two most widely used Canadian art history textbooks either omit or gloss over significant female artists and give to the student the impression that Canada's art is Canadian men's art (McInnes-Hayman, 1980). A widely used text in postsecondary English classes, *The Norton Anthology of English* (4th edition), has no writings by women. A survey done on the 1984-85 Canadian university calendars revealed that in the English courses that listed writers to be studied in their course descriptions, women writers were never more than 1/3 of those mentioned and were usually far fewer (Dagg, 1986). Canadian history textbooks ignore the importance of women or the impact of events on women's lives (Dagg & Thompson, 1988).

The purpose of women's studies courses is to address course content from a female perspective because this has usually not been done in many postsecondary classrooms. However, in Canada, women's studies is underfunded, and there are no tenured professors. Neither has there been any effort in Canadian universities to integrate women's studies into the existing curriculum (Dagg & Thompson, 1988).

A male bias in course and textbook content can contribute to a chilly classroom climate for women. It may lead to a lack of interest in the subject matter, little classroom participation, and to the feeling that women's contributions and ideas are not important. Much more research is needed which directly measures the impact of female oriented course content on women's classroom behaviour and academic goals.

Postsecondary Experience Leading to Women's Achievement and Self-confidence after Graduation

Three studies have examined learning experiences which lead to women's high achievement and self-confidence after graduation. These studies suggest that attending a woman's college, having female teachers, and having leadership experience at the postsecondary level are the most important factors contributing to a woman's greater self-confidence and achievement after graduation.

Tidball (1973) studied a random sample of 1,500 college graduates cited in *Who's Who of American Women* from the years 1910 to 1960. These women are twice as likely to have attended a woman's college than a co-educational college. There were almost twice as many women faculty in women's colleges as in co-educational institutions. Combining data from the two types of colleges indicated that the number of women faculty and the number of women achievers correlated +.953. The number of men faculty neither enhanced nor detracted from the output of women achievers. While the growth in the number of male students paralleled the growth in the number of male faculty, women faculty/women student ratios decreased. From 1930 to 1970 this ratio decreased by 48% in women's colleges and 60% in co-educational colleges. Also, as the proportion of male students increased in both co-educational and women's colleges, the number of women achievers decreased proportionately. Tidball believes that the presence of male students provides a continual reminder to many women that their main task in college is to find a husband and eventually to become a wife and mother rather than have a career. Also the young woman who has few female teachers suffers from a lack of role models for achievement in the world of work.

It must be remembered, however, that these data are correlational. There may be other factors besides the lack of male students and greater number of female professors which contribute to greater achievement by women in women's colleges. For example, a woman who enrolls in a private woman's college may be higher than average in achievement motivation to begin with. The previously reviewed research on student evaluation of teachers, however, supports the importance of female teachers for female students. Women rate female teachers and their progress in female teachers' classrooms higher than they rate male teachers and their progress in male teachers' classrooms.

Tidball (1976) examined the data from a survey of 42,000 faculty responses to a lengthy questionnaire conducted by the American Council of Education. These faculty were representative of teaching faculty in American institutions of higher education in the beginning of the 1972–73 academic year.

Most men faculty were insensitive to issues that affected women students and which aroused their women colleagues. For example, they were more likely to believe that male students comprehend the material better and to believe that claims of discriminatory practices against women have been greatly exaggerated. When the faculty of single-sex institutions were compared, male faculty believed that male students were more committed to studying than were female students, while female faculty believed that female students were more committed to studying than male students. This again suggests the importance of increasing the number of female teachers for female students. Self-evaluation among men faculty was more positive. Women faculty compared themselves negatively against men in all institutions, the least in women's colleges and the most in co-educational institutions. Tidball concluded again that the climate for women is much more supportive in women's colleges. In co-educational colleges there are few adult same-sex role models. These role models tend to have low self-esteem, and more are in the lower ranks without tenure, with salaries less than their male colleagues at every rank. In women's colleges there are more men in alliance with issues that concern women, there are more women faculty, and they tend to have higher levels of self-esteem.

Astin and Kent (1983) examined longitudinal data to determine which college experiences predicted later self-esteem in women graduates. Data sources were from (1) the Co-operative Institutional Research Program (CIRP) which surveyed classes at a representative first year sample of U.S. colleges and universities from 1966 to 1980, (2) a 1980 follow-up of 50,000 people who had participated in the CIRP survey in 1971, (3) the Higher Education General Information Surveys which collect data on institutional characteristics, and (4) a 1972 survey of faculty members at a representative sample of U.S. institutions conducted by the American Council on Education.

Findings from the CIRP data indicated that first year men from 1966 to 1980 consistently gave themselves higher ratings on academic ability, drive to achieve, and understanding others. The 1980 follow-up data indicated that even though the self-ratings of women improved as they got older, their self-esteem still tended to lag behind men.

The researchers identified a subsample of female leaders from the 1980 follow-up data. These were women who at university had been editor of a campus publication, president of a student organization, or a member of a university or departmental committee. These female leaders had higher levels of self-esteem than other women in 1971, and their self-esteem increased to a greater degree by 1980. Relative to all women, female leaders made substantial gains in academic, leadership, and public-speaking ability. Relative to all women and to male leaders, they made substantial gains in popularity, popularity with the opposite sex, intellectual self-confidence, and social self-confidence. Other experiences which predicted increased self-esteem in women from 1971 to 1980 were attendance at a selective institution rather than a public institution or 4-year college, the presence of liberal arts teaching goals by faculty, and research-oriented faculty who socialized a lot with students.

While the above studies do not examine sex bias in the classroom, they hint at more long-term effects of a chilly classroom atmosphere on women's achievement after graduation. These studies support previously cited findings on the importance of female teachers. These studies are correlational, however. It may be that female teachers produce more successful female students after graduation because they are less likely to have sex-biased interaction patterns or because they provide role models for their students. On the other hand, many other factors besides the sex of the teacher may have produced these results. Correlational data showing the negative relationship between the number of male students in the university and the number of female achievers after graduation is interesting. Sternglanz and Lyberger-Ficek (1976) did not find that there was any difference in classroom interaction patterns in classes where males or females were in the majority. However, the number of classes which had female majorities was very small, and the authors did not indicate the percentage of females in female majority classes. More research is needed to determine directly whether the sex dominance of the class affects classroom interaction patterns, satisfaction, and self-confidence.

IMPLICATIONS

There has been increasing concern about sex-biased classroom practices in Canadian universities over the past few years. In spite of this concern, a review of the literature reveals that there is strikingly little research, and strikingly little research in Canada, on whether or not sex-bias exists in the postsecondary classroom, on the factors which facilitate women's classroom participation, or on the kinds of postsecondary classroom experiences which lead to women's greater self-confidence and achievement after graduation.

Research in the following specific areas is needed:

(1) Experimental research is needed to determine whether teacher behaviour affects student classroom interactions. Long (1986) suggests using a pre-post experimental design to compare the classroom interaction patterns of teachers who are trained with those who are not trained in sex equitable behaviour. Experimental research is needed to determine the effects of equitable smiling, eye contact, and interruptions on female class participation. Examination of lecture content is needed, including the effects of female-oriented lecture and textbook content, proportion of female examples and proportion of female professional examples given in lectures, and the effects of the use of "he or she" rather than "he," Hall and Sandler (1982) suggest that women faculty may use a co-operative style; research is needed to determine whether lecturing style influences women's participation.

(2) Although the presence of female instructors is a factor associated with women's greater class participation, satisfaction, and achievement after graduation, it is unclear why this is so. Future research is needed to determine if women professors do have more sex-equitable classroom behaviours.

(3) Research is needed to determine how the sex dominance of a class interacts with sex of instructor to influence classroom participation. Perhaps females are least likely to participate in male majority classes with male instructors, most likely to participate in female majority classes with female instructors, and likely to participate in moderate amounts when sex of instructor and sex dominance of the class are mixed. If this is so, the specific factors which contribute to decreased female participation need to be researched. Perhaps male majority classes with male instructors are most characterized by a combative lecturing style in which female students are frequently interrupted by the teacher and the male students. Perhaps mostly male examples are given, and a female perspective on the issues is never taken.

(4) The impact of gender bias on women in non-traditional majors needs to be researched. Stemglanz and Lyberger-Ficek (1976) investigated classroom interaction patterns in science vs non-science classes but did not investigate student major. Hall and Sandler (1982) suggest that women majoring in non-traditional fields may be especially likely to face difficulties in the classroom because they comprise a distinct minority in a class, they find few female teachers who might serve as role models, and they work with professors who are not accustomed to having women students in their classes. One problem encountered in trying to encourage women to enter non-traditional fields is the drop-out rate. In spite of acceptable grades, many women switch to traditionally female majors. More research is needed to determine whether training instructors in traditional male fields in sex-equitable behaviour decreases the likelihood of female students switching to more traditional fields.

(5) Other areas for future study include investigation on how best to train teachers in sex-equitable behaviour, gender bias in graduate school both in and outside the classroom, and gender bias against males in traditionally female majors.

CONCLUSION

There is not much published research on sex-biased classroom practices in the post-secondary classroom, and not much published Canadian research. However, what has been published does raise many interesting questions.

Many studies have found that women students do not participate as much as men students in the classroom, especially in male-taught classes. Researchers have not investigated what contributes to this lack of participation by females. Possible factors include the lack of female role models and gender biased classroom behaviour on the part of professors: differential smiling, eye contact, interrupting, the number of direct questions posed to students, and the number and kinds of male and female examples given and the lack of a female perspective taken on the subject matter.

Researchers have not investigated how the sex dominance of the class interacts with sex of instructor to influence classroom interaction patterns. If a male-taught class with male students in the majority is least likely to facilitate women students' participation, what are the factors which prevent women from participating? Do instructors in these classes adopt a more combative lecturing style? Are they less likely to give female examples or take a female perspective on the issues?

Researchers have not investigated the impact of gender bias on women in non-traditional majors. Is this a factor leading to many of these women switching to more traditional majors? If instructors in these majors are trained in sex equitable classroom behaviours, will this reduce the drop-out rate?

Training instructors in sex-equitable classroom behaviours facilitates women's classroom participation. However, the inclusion of content on women in courses may sometimes lead to defensive angry reactions on the part of students. More research is needed on how to train instructors in sex-equitable behaviour and on how to include content on women to avoid negative reactions in students.

Studies examining students' perceptions of their teachers indicate the importance of female teachers for female students. Female students perceive female faculty as more interested in them and report more progress.

Research investigating postsecondary experiences leading to women's achievement and self-confidence after graduation indicate the importance of female teachers for female students. Women who have attended women's colleges which have a greater proportion of women faculty, are disproportionately represented in *Who's Who of American Women* from 1910 to 1960. postsecondary leadership experiences and opportunities to socialize with faculty are factors which contribute to increased levels of self-esteem in women after graduation. More research is needed to examine the long-term effects of sex-equitable classrooms on women's achievement levels and self-confidence after graduation.

Many individuals have expressed concern about removing any barriers in the postsecondary environment that might discourage women from maximizing their potential. A review of the literature on gender bias in the classroom raises many interesting questions. More research is needed on teacher classroom behaviours which facilitate greater female participation in the classroom, which increase female enrolment in non-traditional majors, and which lead to women's high achievement and self-esteem after graduation.

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Gender Issues in University: The University as Employer of Academic and Nonacademic Women and Men

E. DIANNE LOOKER*

Acadia University

Abstract

This paper examines data from a small university in Atlantic Canada, focusing on the university as employer, in order to highlight one aspect of the impact of gender on universities. The data include official records on all employees, details from contracts and terms of employment, responses to questionnaires sent to all employees, and unstructured interviews conducted with university officials. Employees belong to one of six groups: faculty, librarians, professional and technical workers, secretarial-clerical workers, physical plant employees, and "non- classified". Working conditions and salaries vary across groups and within groups by step, rank or level. Women employees are concentrated in the secretarial-clerical group, one of two with restrictive working conditions. Women are more likely than men to be part-time employees, with few employee benefits. Men dominate the higher ranks of each group; women are concentrated at the lower ranks. Regression analyses of salaries show that, even with controls for rank, seniority and education, women in each employee group tend to earn considerably less than their male colleagues. Responses to the questionnaire reveal that women report more gender discrimination and sexual harassment than do men. The analysis highlights the importance of developing structures to address issues of gender equity for all university employees.

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Résumé

Cet article présente les données provenant d'une petite université des Provinces de l'Atlantique et examine l'Université en tant qu'employeur par rapport à un aspect de l'impact du sexe sur les universités. Les données incluent des informations extraites des dossiers officiels sur les employés-es, des détails sur les contrats de travail et les conditions d'emploi, des réponses aux questionnaires distribués à tous les employés-es et des résultats des entrevues non-structurées effectuées auprès des cadres de l'Université. Les employés-es sont catégorisés-es en six groupes: professeurs, bibliothécaires, travailleurs professionnels et techniques, secrétaires et/ou employés-es de bureau, employés-es du bâtiment et autres employés-es non-classé-es. L'étude montre que les conditions de travail et de salaire varient d'un groupe à l'autre et, à l'intérieur des groupes, par échelon, rang et niveau. Les employées de sexe féminin se concentrent dans le groupe des secrétaires et/ou des employés-es de bureau, une sur deux ayant des conditions de travail limitées. Les femmes, plus quel les hommes, occupent des employés à temps partiel bénéficiant d'avantages sociaux limités. Les hommes dominent les rangs les plus élevés de chaque groupe d'emploi; les femmes se concentrent dans les rangs les plus bas. Les analyses de régression sur le salaire montrent que même en contrôlant pour le rang, l'ancienneté et l'éducation, les femmes dans chaque groupe d'emploi ont tendance à gagner considérablement moins que leurs collègues masculins. Les réponses aux questionnaires révèlent également que les femmes rapportent davantage de situations de discrimination selon le sexe et de harcèlement sexuel que les hommes. Les analyses soulignent donc l'importance de développer des structures appropriées pour traiter des questions d'équité d'emploi concernant tous les employés de l'Université.

There has been considerable interest in the university as employer, especially as an employer of faculty. However, in order to get a more complete picture of employer policies we must consider the position of non-academic employees as well. This paper will examine data from one case study of a small university in the Atlantic region to compare and contrast the treatment of academic and non-academic employees.

Many studies have been undertaken to examine the status of women at different institutions (see references). These reports document a discouragingly consistent picture of women faculty being at a disadvantage when compared to their men colleagues. In this comparison of faculty with other employees, particular attention will be paid to the position of women, in order to examine whether the situation that has been documented for faculty exists for the non-academic staff as well.

The same individuals in the senior administration set the policies for all employees and create the climate in which women and men employees work. As Backhouse et al. (1989) document for the University of Western Ontario, this is often a very "chilly climate" for women. Including the non-academic staff in the analysis highlights the irony of the situation of many women employees. Despite their large numbers (a majority at the

institution examined in this study) women are marginalized into the less visible and less powerful positions. Status of women reports from many universities have documented the marginalization of women faculty. This study will present data to show that both women and men faculty have several advantages over their non-academic co-workers. Within each category, however, women are consistently disadvantaged relative to men.

DESCRIPTION OF THE DATA

There are four separate data files that will be used for this case study. Two of these are drawn from the official personnel files of faculty and other staff. These files contain data on the employee's position, type of employment, grade or rank, and salary. Most of the analyses reported below are based on these official data. Other data come from a survey of all employees, done in 1986-87, which asked about working conditions, union involvement and perceptions of discrimination. Some supplementary information is also taken from the formal or informal collective agreements for the different groups of employees. Unless otherwise indicated, all the data refer to the academic year, 1986-87.

Official personnel data were obtained for virtually all individuals who were employed at this institution in the academic year 1986-87, including the senior administrators. The only exceptions were casual staff hired for less than two weeks, faculty who taught one course, and one individual whose faculty file was misplaced when he became a member of the non-academic staff. The survey was undertaken on behalf of the university's status of women committee, with the support of the university administration. After pretesting of the data instruments, questionnaires were sent to all faculty and staff in early 1987. Reminder letters and a second copy of the questionnaire were sent to non-respondents. The final response rates for the questionnaires were 71% for faculty and 53% for the non-academic staff.

The response rates were particularly low for employees working in the physical plant. Their response rates to surveys from the university administration are typically lower than for other groups. In this instance, the rates were depressed further by the fact that the surveys were distributed at a time when some contentious negotiations for a new contract were underway. Also, some non-respondents told the researcher that they feared they could be identified since the survey included detailed questions about their position.

It is important to note that no tests of statistical significance are calculated in this analysis. The data set can be seen as either a total population (of employees at this institution in 1986-87), or a non-random sample across time of one year. Neither of these interpretations justifies the use of tests of statistical significance. The differences between men and women discussed in detail in the text are large enough to meet the criteria of substantive (as well as statistical) significance.

The employees fall into six categories or groups: (1) faculty, (2) librarians, (3) those in professional or technical positions (who are subclassified into four, hierarchically arranged subgroups), (4) those in secretarial or clerical positions, (5) physical plant

workers and (6) those whom the personnel office refers to as "nons," who are not in any of these five categories. The "nons" include a lot of part-time employees, such as library assistants and summer workers, as well as the senior administrators and some others who report directly to a vice president or higher. The "physical plant" group has three sub-groups with different contractual arrangements: (a) the steam plant engineers, (b) those in skilled trades and maintenance, and (c) those in "housekeeping" (custodians and laundry workers).

In 1989 a new category of "senior manager" was created, comprised of thirteen men who report directly to the president or to a vice-president. The positions included were: the Directors of Admissions and Student Assistance, Alumni Services, Information Services, Development, Personnel, Physical Plant, Security, Student Services, the Computer Centre, as well as the Comptroller, Registrar, University Librarian and University Chaplain. Some of these had been "non;" others were at the highest level of the professional-technical group in 1986-87.

Faculty, the three physical plant sub-groups, and the secretarial-clerical staff have formal collective agreements recognized under the provincial trade union legislation. The librarians, and the professional-technical staff have informal but written agreements that spell out duties and responsibilities. The "nons" have no corresponding document. For the part-time and casual staff among the "nons," this tends to mean there is no room for negotiation. They are paid at or close to the minimum wage and have no job protection or benefits. For the high status "nons", the lack of any formal document means that they have considerable flexibility in negotiating their individual salaries, working conditions and job duties. As is true with any such organization, the highest ranking administrators are themselves employees, but they are also charged with the responsibility of setting employment policies on behalf of the Board of Governors. They are both employers and employees.

EMPLOYEES AND THEIR WORKING CONDITIONS

The university being examined is small; the student body ranges from 3000 to 3500. There are only 268 faculty, 217 men and 51 women. There are considerably more non-academic staff, 478 at the time of the data collection. What is more, over half (52%) of the non-academic staff are women. Despite a common image that universities are predominantly male institutions, there are more women than men among the non-academic staff, and there are more women among the non-academic staff than there are men faculty.

Although they are all employed by the same organization, there are quite different terms of employment set out for the different groups of employees. Trying to get an accurate picture of the various sets of conditions for employees is complicated by the fact that the composition of these groups changes, as do the terms of employment as new negotiations are completed. The terms for the different groups change at different times and in different ways. All one can do is get a snapshot of conditions at one time, recognizing that some details of the descriptions may be made inaccurate before the description is even

published. Nevertheless, the gender differences, reported below, have been in place for over fifteen years, and are not likely to be affected by these minor shifts.

The working conditions of employees very much depend on the employee group to which they belong. A comparison of the terms of employment for the different groups and sub-groups documents the fact that benefits are distributed in an explicitly hierarchical fashion. Certain groups, especially faculty and librarians, have more generous provisions and more flexible arrangements, while others, especially physical plant and secretarial-clerical workers are more restricted. This hierarchy is explicitly written into the terms of employment for the professional-technical employees; sub-groups 1 and 2 have much more restrictive working conditions than do subgroups 3 and 4.

Sick leave provisions vary among the different employee groups (see Table 1A). Physical plant workers are entitled to one and half days per month, up to a maximum accumulation of 130 days. Secretarial-clerical workers, and those in the lowest two subgroups of the professional-technical staff get one and three quarter days per month. The contract for the secretarial-clerical staff, but no others, has a provision that "excessive intermittent use of [sick leave] benefits may be considered as chronic absenteeism . . ." Librarians, faculty and those in the higher professional-technical subgroups are entitled to full pay for up to six months sick leave.

Vacation provisions are based on seniority for physical plant workers and the secretarial-clerical staff (Table 1B). Vacation entitlements for the professional-technical employees are based on a combination of sub-group rank and seniority. Librarians may take 22 days vacation, plus an additional 5 days after 20 years of service. A full-time faculty member is entitled to a month's vacation any time outside the fall-winter academic session.

There is provision for emergency leave for most employees. For physical plant workers this is restricted to two days, and is allowable only for "fire or flood in his [sic] home." Other employees have no prespecified restrictions on the length of emergency or compassionate leave; for secretarial staff emergencies can include serious illness of a family member, as well as "fire or flood". There is no restriction on the type of emergencies that are considered for faculty or librarians.

Bereavement leave is provided for separately. Secretarial and professional-technical staff have up to three days, physical plant workers up to five days. No prespecified limits exist for faculty or librarians.

One set of benefits that particularly affect women includes provisions for maternity, paternity and adoption leave. The university provides paid maternity leave only for librarians and faculty, for a period of up to twelve weeks. Other full-time, non-probationary employees can be granted an unpaid leave of absence, during which time they are eligible for maternity benefits under unemployment insurance provisions. They are assured that they will be rehired at the same or a similar position once they return to work. Men in the physical plant are allowed eight hours leave during their wives' "confinement;" men in the secretarial-clerical and the professional-technical groups are entitled to one day's leave.

Table 1A

Selected Benefits, Five Employee Groups

	Employee group				
Benefits	Physical Plant	Secretarial Clerical	Professional Technical[a]	Librarians	Faculty
Sick Leave	1 & 1/2 days per month	1 & 3/4 days per month	S1+S2: – 1 & 3/4 days per month S3+S4: – 6 months	6 months	6 months
Vacation Allowance	<1 year: 1 day/mo 1-2 years: 2 weeks 2-10 years: 3 weeks 10-20 years: 4 weeks >20 years: 5 weeks	<1 year: 1 day/mo 1-2 years: 10 days 2-10 years: 15 days 10-20 years: 20 days >20 years: 25 days	see Table 1B below	22 days (+5 days after 20 years)	1 month
Bereavement leave	5 days	3 days	3 days	No specified limit	No specified limit
Maternity leave	Unpaid leave + U.I.C.	Unpaid leave + U.I.C.	Unpaid leave + U.I.C.	Full pay 12 weeks	Full pay 12 weeks
Paternity (for birth)	8 hours	1 day	1 day	No specified limit	No specified limit
Prescribed Breaks	2 x 10 min	2 x 15 min	S1+S2 2 x 15 min S3+S4 No specified limit	No specified limit	No specified limit

[a] Differences for subgroups indicated where S1, S2, S3, S4 stands for subgroups 1 through 4

Table 1B

Vacation Provisions, Subgroups, Professions-Technical Employees

Vacation Entitlement	*Service Requirement*			
	Subgroup1	Subgroup 2	Subgroup 3	Subgroup 4
10 days after	1 year	-----	-----	-----
15 days after	2 years	1 year	-----	-----
20 days after	10 years	10 years	1 year	1 year
25 days after	20 years	20 years	20 years	20 years

Men who are faculty or librarians can apply for up to six weeks paternity leave if their "spouse, though currently employed, is unable to obtain paid maternity leave because of the employment policies in practice at her work place." Leave for a man who is a faculty member or librarian, in order to attend the birth of his child, would be provided for by his flexible schedule and the wide-ranging provision for emergency and/or compassionate leave. Adoption leave of up to four weeks without pay is available to employees, other than faculty or librarians who are eligible for six weeks with full pay.

Consistent with their definition as professionals, faculty and, to a lesser extent, librarians and those in the top sub-groups of the professional-technical staff, have considerable flexibility about when they have to be on campus. Other employees have designated hours, as well as prespecified times for lunch and breaks. Physical plant employees are paid on the basis of a forty hour work week; other non-faculty employees are expected to work thirty-five hours per week. No set hours are specified for faculty, librarians, senior managers or administrators who are expected to keep flexible hours and work overtime, without extra pay, as required by their job duties.

Physical plant workers are entitled to two ten minute breaks and a thirty minute lunch break; others have two fifteen breaks and an hour for lunch. Physical plant workers are the only ones who have to "punch in and out" with a time clock. They are allowed 8 minutes leeway per day. Beyond that, they are docked pay for each 15 minute period they are late, no matter what the reason. Heavy snowfalls with drifting make many roads impassable several times during the winter; the financial penalty for lateness would apply to any physical plant worker delayed by snow or other weather conditions.

Gender can affect benefits at least three ways. The first occurs when women (or men) are concentrated in positions that carry more restrictions than others. The second

occurs when men and women are distributed at different levels, ranks or grades within a given group. A third results if one gender forms the majority of part-time employees, since part-time employees rarely share the benefits available to their full-time co-workers.

Table 2 shows the distribution of men and women across the broad employee groups. The first part of the table (Table 2A) gives the percentage of men and women in each group. Women make up 85% of the secretarial-clerical staff, 61% of the "nons", 44% of the professional-technical group, 5 of the 9 librarians, 19% of faculty, and 18% of the physical plant workers. If one examines only full-time employees (data not shown) the percentage of women in the different groups changes somewhat, but the overall picture is still the same. Women are concentrated in the secretarial-clerical positions and form a minority in the faculty and the physical plant. The percentage of full-time employees who are women drops to 54% among the "nons" and to 42% among the professional-technical staff.

Table 2B shows the distribution across groups run separately for men and women. Faculty, physical plant and the secretarial- clerical groups are the three largest. Almost half (48%) of the male employees are faculty; another 25% work in the physical plant. The largest concentrations of women are found in the secretarial-clerical group (37%) and the "nons" (25%).

There are some important gender differences within each of these groups as well. Table 3A shows a pattern that is familiar to many of those who have examined the position of faculty women. Women dominate the lower ranks, (Lecturer and Assistant professor) while men dominate the higher ones. The picture has changed a bit since the time of this data collection. The distribution of men is almost identical in 1989-90 to what it was in 1986-87. The percentage of women who are full professors increased so that 21% of the 68 women in 1989-90 have attained this rank. At the other end of the scale, however, the proportion of women lecturers increased from 21% to 34% in that three year period. Both men and women among the secure, tenured faculty are moving through the ranks. Other faculty, especially women, are caught in the more tenuous, low level, contractually limited positions.

Half of all the men in the non-academic staff work in the physical plant. Two of the three subgroups of physical plant workers have no women: the steam plant engineers and those in trades and maintenance. The women are all in "Housekeeping", the classification with the lowest pay. Only one woman among the physical plant workers is a "foreman"; none of the five supervisors is a woman.

Among the librarians, the only differentiation takes the form of having administrative duties. The two Heads of Division are men, as is the University Librarian, who falls into the "non" grouping. This was not always the case. The Library is, in fact, one of the few areas of this university which have been headed by a woman.

The "nons" have no terms of reference and so no formal ranking scheme. The high level "nons" (the senior administrators, the university chaplain and the Head Coach of the football team) are all men.

Table 2A

Distribution of Employees by Gender in Each Group

	Men	Women	% Women	Total
Physical Plant	115	25	18%	140
Secretarial/Clerical	20	111	85%	131
Professional Technical [a]	48	37	44%	85
Librarians [b]	4	5	55%	9
Faculty	217	51	19%	268
"Non"	48	75	61%	123

[a] Includes senior managers

[b] Excludes the Head Librarian, classified as "Non".

Table 2B

Distribution of Employees by Group for Men and Women

	Men	Women	Total
Physical Plant	25%	8%	19%
Secretarial/Clerical	4%	37%	18%
Professional Technical [a]	11%	12%	11%
Librarians [b]	1%	2%	1%
Faculty	48%	17%	36%
"Non"	11%	25%	15%
Total	**453**	**304**	**757**

[a] Includes senior managers

[b] Excludes the Head Librarian, classified as "Non".

Table 3A

Gender by Rank or Level with Employee Group— 3A Faculty

	Sex	
Rank	Men	Women
Full Professor	36%	10%
Associate Professor	37%	26%
Assistant Professor	22%	43%
Lecturer	6%	21%
Total	**202**	**42**

Table 3B

Gender by Rank or Level with Employee Group — 3B Physical Plant

	Sex	
Level	Men	Women
1. Probationary	15%	8%
2. Nonprobationary	71%	88%
3. Foreman/Supervisor	14%	4%
Total	**113**	**24**

Table 3C

Gender by Rank or Level with Employee Group — 3C Librarians

	Sex	
Level	Men	Women
Head of Division	2	0
Other	2	5

The professional-technical group has eight "grades". Under their terms of agreement, these are collapsed into four sub-groups. Although women make up almost half of this group overall, Table 3D shows that they are concentrated at the lower end of the scale. Well over half of them (13% + 45%) are in the two lowest sub-groups, with the most restrictive benefits. Men outnumber women in the two highest sub-groups. This dominance of men at the higher ranks holds even when the men classified as senior managers are excluded; 46% of the 26 men left in this group are in subgroup 3, 15% are in sub-group 4.

The secretarial-clerical group is especially interesting, partly because 45% of the women with non-academic positions are in this group. As indicated above, over 80% of this group are women. Despite their large numbers and proportion, women do not "dominate" this group. Table 3E shows that, once again, women are clustered at the low end of the grade scale, with over half (4% + 12% + 44%) of them in levels 2, 3 or 4. (In the mid 1980s "level 1" was eliminated from the grid, so the lowest remaining level is "level 2"). Only a quarter of the few men in this group have such a low grade level, and these individuals are all at level 4. At the other end of the scale, there is a higher percentage of men than women; what is more, the men outnumber the women (8 men and 5 women are in the two highest grades).

Table 3D

Gender by Rank or Level with Employee Group — 3D Professional & Technical*

	Subgroup				
Sex	1	2	3	4	Total
Men	5%	22%	32%	41%	39
Women	13%	45%	39%	3%	38

* 1989-90 data, includes "senior managers"

Table 3E

Gender by Rank or Level with Employee Group — 3E Secretarial Clerical

	Grade							
Sex	2	3	4	5	6	7	8	Total
Men	0%	0%	25%	15%	20%	35%	5%	20
Women	4%	12%	44%	24%	12%	4%	1%	110

Not only are women more likely to be in certain groups, they also make up more than half of the part-time employees. Half of all the 154 part-time workers are classified as "nons," and 50 (64%) of these 77 "nons" are women. All of the part-time secretarial-clerical workers are women. While part-time men faculty outnumber their women counterparts (26 men versus 15 women), this ratio reflects the male dominance of the faculty positions overall. Proportionately more women than men are in part-time faculty positions. Men dominate part-time as well as full-time positions in the physical plant. There are no part-time librarians.

The distinction between full and part-time employees has a dramatic impact on access to benefits. Part-time employees have no job security, no pension benefits, limited or no sick leave provisions. Not surprisingly they also have lower salaries than those in full-time positions.

To summarize this section: there is gender segregation among the university employees along several dimensions. Women are more likely to be in certain categories of employees (especially the secretarial-clerical and the "nons"), while men are concentrated in others (faculty and physical plant). Within each group, even the ones dominated by women, women are more likely to be at the lower grades or ranks, while men dominate the higher levels. There is also a gender difference in the type of employment. Men are more likely than women to have full-time positions; a corresponding disproportionate percentage of women are employed part- time.

ACCESS TO POWER AND INFORMATION

There are a number of ways employees can influence and improve their individual or collective situations. An important ingredient is access to information. Those in supervisory or administrative positions have more information than those they supervise about how and why decisions are made. They also have more say in these decisions.

Ten percent of the women and sixteen percent of the men faculty members were in some administrative position in 1989-90. This reflects mostly those who are Heads of Departments or Directors of Schools. Only one woman in the university's history has ever been Dean of a faculty; she was appointed in 1982. No woman has ever served as vice president or president. The gender distribution within the other employee groups, already examined, documents that men dominate the higher level, supervisory positions among the non-academic staff as well.

Many of the faculty, librarians and the professional- technical workers would have access to information about the internal organization of employees described in this paper. Some of those in the professional-technical group are the ones who handle personnel files. Those in the physical plant and secretarial-clerical positions are less likely to be aware of the benefits and constraints operating for different employees. For the custodial staff this may be a reflection of their education level. While most employees have some postsecondary training, either in trade school or business school, the custodial staff

have, on average, completed only grade 9. One custodian who has served on the Status of Women Committee confided to me that she "could read and understand at least some of the stuff" in the status of women report. Many of her co-workers assume that such information is beyond their comprehension. Nevertheless, even supervisors or directors may not have information beyond that for their own group. It was not unusual for faculty and supervisory staff to learn about the structure and organization of the different employee groups through the status of women report.

Only those who negotiate the contracts and set the salaries for all employees get to see the overall picture. These are the senior managers, and the senior administrators (president and vice presidents). Access to these individuals, and to the Board of Governors, which formally sets the policies recommended by these administrators, is obviously a source of both information and power. The senior managers by definition report directly to a vice president or to the president. For most other employees there is a clearly delineated line of command set out, through supervisors and these senior managers. Faculty have a similar formal line of command, through their Department Heads and Deans or Directors. However, since faculty members serve on many of the decision-making bodies of the university (senate, curriculum committees, search committees for senior administrators, etc.) they have access to both information and power that are denied other employees. The small size of the university also facilitates informal access to administrators. Faculty can, and frequently do, call and meet with a vice president or the president with relatively short notice to discuss an issue, air a complaint, or lobby for a cause. What is more, faculty have three seats on the Board of Governors and one place on the powerful Executive of the Board.

Students and administrators are the only other internal university groups with representatives on the Board. Student representatives present specific issues to the Board that are of concern to students. They tend to have little to say about other matters the Board discusses. Their influence on the Board is reduced, not only by their status as students, but also by the fact that they are elected for one-year terms while all other Board representatives serve for three years. Non-faculty employee groups have been explicitly denied access to membership on the Board.

Another potential source of both information and power can be found in the unions or organizations representing the employee groups. The "nons", by definition, have no organizing group. The professional-technical staff have "terms of employment", but no formal organization. For the past several years, since the removal of the senior managers from this group in 1989, no meetings of this group have been called; no one seems to know who would call it. The faculty, physical plant and secretarial-clerical staff all belong to formal unions.

In the survey, respondents were asked how often they attend meetings of their union or group. Less than a quarter of the eligible employees say they regularly attend these meetings. Among the faculty, women were more likely than men to say that they attended "regularly"; women were also more likely to say they attended "rarely" (men tended to

say "occasionally"). Among the non-academic staff, women were less likely than men to attend union meetings "regularly" or "occasionally."

In both their terms of employment, and their access to power and information, faculty enjoy a favourable position within the university relative to other employees. Only the senior managers and senior administrators (especially the latter) could be seen as having as many (or more) benefits, flexibility and power. Women tend to be concentrated in the least powerful groups and tend to have the lowest levels of benefits within those groups, either because of their part-time status, or because of their low rank. The employees' groups and unions do not appear to have done much to rectify the powerlessness of many of the employees. Even in the woman-dominated secretarial-clerical group, most of the employees are only marginally involved in the union.

These gender differences affect various aspects of the employees' experiences. The next section will examine the effects on employee salaries and on their perceptions of how equitable the university is an employer.

SALARIES

Many employees define salary as the most important "benefit" provided for in their terms of employment. One could do a detailed analysis focusing exclusively on employee salaries, what variables affect them and how these effects differ for the different groups. This analysis will restrict itself to two issues: how faculty salaries compare to those of other employees, and how gender influences salary across and within groups.

Table 4 shows the mean and median yearly salaries (a) for all employees and (b) for full-time employees in each group. For those employees working less than a full year (such as full-time faculty with 9 month positions, as well as any part-time employees), the "yearly salary" was calculated by prorating their salary as if they were employed the full year. So, a nine month sessional's salary would be multiplied by a factor of 1.33. This gives a false impression of how much these individuals earned, but it allows for comparisons across categories.

In Table 4 the thirteen senior managers and four senior administrators have been separated out since their salaries reflect their administrative positions, not their group affiliation (e.g., the vice-president academic and the president are technically "faculty", but their salaries are not set by the faculty union). Both the mean and the median salaries for faculty are higher than for any other non-administrative group. One could argue that these higher salaries are warranted by the fact that faculty have higher levels of education than any other group, and/or by the claim that faculty are essential to the teaching and research goals of the university. Senior administrators and managers claim even higher salaries on the basis of the level of responsibility they bear and the unpredictable, and often lengthy hours they have to work. This unpredictability of time demands make administrative positions more problematic for those with responsibility for young children, often women.

Table 4

Mean and Median Annual Salaries for all Groups, by Gender, for:

A. All Employees, and B. Full-time Employees

	Annual Salary			
	Mean		Median	
Group	Men	Women	Men	Women
A. All employees				
Physical Plant	$18,830	$16,352	$17,156	$16,244
Secretarial-clerical	$19,712	$15,484	$19,967	$15,077
"Non"	$14,408	$10,830	$9,450	$9,458
Professional & Technical	$31,002	$23,643	$30,263	$22,850
Librarians	$32,693	$26,129	$32,692	$27,642
Senior Management	$47,858	a	$47,300	a
Senior Administration	$79,800	a	$78,925	a
Faculty	$42,498	$32,938	$44,376	$34,785
B. Full-time Employees				
Physical Plant	$19,200	$16,407	$17,179	$16,261
Secretarial-clerical	$20,232	$15,955	$20,020	$15,574
"Non"	$36,258	$12,864	$35,880	$10,157
Professional & Technical	$31,558	$24,566	$31,905	$23,390
Librarians	$32,693	$26,126	$32,693	$27,642
Senior Management	$47,858	a	$47,320	a
Senior Administration	$79,800	a	$78,925	a
Faculty	$45,298	$38,351	$45,961	$37,300

[a] No women in this category

Among the other employee groups, the "nons" stand out as having the lowest average salaries, reflecting the large number of sessional employees working at minimum wage. Women in the secretarial-clerical group, and both men and women in the physical plant have lower salaries, on average, than those in other groups. The low levels for the secretarial-clerical workers are particularly interesting, given that they have higher levels of education than most of the physical plant workers. The secretarial staff argue, with some justification, that their jobs require more responsibility than many of those in the physical plant, especially custodial workers. Custodial workers tend not to be exposed to the physically stressful demands placed on some other physical plant employees (noise, heat, heavy labour). Yet almost a quarter of the full-time secretarial staff make less than the lowest paid full-time custodian, even after adjusting for the different length of the work week for the two groups.

Given the different skill and education requirements for the positions among the employees, any detailed analysis of salary has to take into account the variation in pay scales for the different groups. Table 5 presents regression analyses of annual salary for five employee groups. The few librarians have equivalent levels of education, no grade or ranking system, are all full-time employees and have little variation in seniority. With only ten individuals and so little variation, a regression analysis makes little sense. For librarians, the gender differences are reflected in the means and medians reported in Table 4.

The most important finding to note from Table 5 is that, for all employee groups, gender has a large impact (in terms of dollars and in size of effect as measured by the "betas") on employees' salaries, even after controlling for education, rank or grade, seniority and terms of employment. This gender effect is evident whether one considers all employees or just those with full-time positions. The consistency of this pattern makes it clear that within all employee groups, even when one takes into account their lower positions, women do not receive the same benefits as their male co-workers.

PERCEPTIONS OF INEQUALITY

The surveys sent to faculty and staff asked not only about their positions, but also about their perceptions of inequities in the ways men and women are treated. Table 6 shows the responses of faculty and the non-academic staff to questions about hiring, promotion, and salaries as well as whether the individual respondent had personally experienced "discrimination based on gender" or "sexual harassment" at the university. Controlling on each employee group for these detailed tables reduces the case base to the point where comparisons of percentages are meaningless, so all non-academic employees are grouped together for this section of the analysis.

Less than half the faculty and staff think there is equity in the hiring procedures. (See Table 6A.) Women are more likely than men to say men have the advantage, but few suggest women do. Overall, 15% of faculty and 10% of the non-academic staff see men having an advantage. This difference may reflect the fact that faculty have more say in hiring

Table 5
Regression Analysis of Salary by Group

A. Physical Plant	All Employees		Full-time Employees	
Dependent Variables:	b	beta	b	beta
Education	199.43	.21	219.41	.21
Years at the University	229.66	.38	228.40	.34
Terms of Employment[a]	– 37.75	– .01		
Grade	945.65	.15	938.79	.10
Gender[c]	– 1711.96	–.17	– 1798.38	– .17
Constant	15,016.86		14,756.78	
R^2	.32		.28	

B. Secretarial/Clerical	All Employees		Full-time Employees	
Dependent Variables:	b	beta	b	beta
Education	59.09	.04	70.67	.05
Years at the University	233.90	.27	233.53	.29
Terms of Employment[a]	1805.10	.19		
Grade	1435.71	.58	1512.14	.65
Step	77.39	.04	179.57	.10
Gender[c]	– 1219.20	– .13	– 1042.42	– .12
Constant	5492.93		7829.42	
R^2	.76		.87	

C. Professional/Technical[b]	All Employees		Full-time Employees	
Dependent Variables:	b	beta	b	beta
Education	177.72	.07	119.92	.05
Years at the University	358.92	.27	229.61	.19
Terms of Employment[a]	6118.40	.31		
Grade	2589.67	.53	2894.52	.69
Gender[c]	– 3435.70	– .24	– 4131.46	– .35
Constant	4117.78		18,374.71	
R^2	.73		.69	

[a] Full-time versus part-time [b] Includes senior managers [c] where 1=male, 2=female

Table 5 (cont.)

D. "Non"	All Employees		Full-time Employees	
Dependent Variables:	b	beta	b	beta
Education	752.70	.17	1248.16	.19
Years at the University	974.86	.38	1176.91	.43
Terms of Employment[a]	12,050.11	.39		
Gender[c]	– 747.94	–.03	– 1245.67	– .27
Constant	– 15,461.72		14,823.01	
R^2	.48		.52	

E. Faculty	All Employees		Full-time Employees	
Dependent Variables:	b	beta	b	beta
Rank	5064.95	.46	5292.42	.48
Years at the University	511.57	.39	515.08	.39
Terms of Employment[a]	2401.13	.12		
Gender[c]	– 3223.58	– .12	– 3431.96	– .12
Constant	16,970.55		25,768.94	
R^2	.69		.67	

[a] Full-time versus part-time [b] Includes senior managers [c] where 1=male, 2=female

and may be correspondingly better informed. Or, it may reflect the fact that there are more women among the non-academic staff. We need more detailed qualitative data from employees at a range of institutions to understand the reasons behind this kind of employee perception.

Another survey question asks about gender equity in salaries. (See Table 6B.) Despite the very large differences in salary levels, non-academic employees are as likely as faculty to say there is equity (42% and 43%). In both categories of employees twice as many women as men see men having an advantage.

Faculty are much more likely than the non-academic staff to see promotions as fairly dispensed (Table 6C). Sixty-two percent of faculty compared to 49% of other employees say men and women are equally likely to be promoted. For both academic and nonacademic respondents, women are more likely than men to perceive the promotion process as biased in favour of men.

Table 6

Perceptions of Gender Equity by Gender: Faculty and Non-Academic Employees

A. Hiring	Faculty			Non-Academic Employees		
	Men	Women	Total	Men	Women	Total
Men Advantage	11%	26%	15%	8%	12%	10%
Women Advantage	4%	2%	4%	1%	3%	2%
Equal	41%	36%	40%	56%	34%	44%
No Opinion	43%	36%	41%	36%	51%	44%
B. Salaries	Men	Women	Total	Men	Women	Total
Men Advantage	11%	21%	13%	8%	21%	15%
Women Advantage	0%	0%	0%	0%	1%	0%
Equal	44%	33%	42%	57%	31%	43%
No Opinion	44%	46%	45%	35%	47%	41%
C. Promotions	Men	Women	Total	Men	Women	Total
Men Advantage	8%	19%	10%	14%	23%	19%
Women Advantage	2%	0%	2%	3%	4%	4%
Equal	68%	43%	62%	60%	40%	49%
No Opinion	22%	38%	28%	22%	33%	28%

D. Percentage who had Personal Experience with Gender Discrimination

Faculty				Non-Academic Employees			
Men	Women	Total	n	Men	Women	Total	n
8%	37%	15%	184	7%	15%	11%	221

E. Percentage who had Personal Experience with Sexual Harassment

Faculty				Non-Academic Employees			
Men	Women	Total	n	Men	Women	Total	n
11%	38%	17%	182	10%	23%	18%	137

There are two important differences in the promotion procedures for the two groups. Decisions concerning faculty promotions are made by a committee of faculty members, elected by faculty. Promotions among the non-academic staff are decided by supervisors and administrators. Secondly, for the non-academic staff, promotions often involve a "zero sum" decision process. If one person gets a promotion to a specific higher level position it means someone else does not. There are only so many high level positions, especially ones which carry supervisory rank (and salary and benefits). For faculty there is no pre-set number of full or associate professors. Once someone is hired and tenured, there is no direct disadvantage to anyone else if this individual is promoted to a higher rank. Faculty women can be promoted without affecting the number of men also promoted. The same is not the case for the women in non-academic positions.

Overall, more than a third (37%) of the faculty women say they have personally experienced gender discrimination (Table 6D). Not all of this discrimination reflects the actions of the university as employer, except to the extent that the university is responsible for ensuring a non-discriminatory working environment. It is often a reflection of the actions of other employees. Women tell of their research being down-played, their suggestions in committees ignored, their applications for promotion not supported. The official records show that women spend longer in rank than men, and are less likely to put themselves up for promotion; but once they do, they are more likely to be promoted. In their descriptions of the process, it is clear that many women feel the cards are stacked against them, so they wait until their credentials are even stronger than those of their men colleagues who get promoted sooner.

Women in the non-academic staff report more discrimination than their male coworkers (15% versus 7%). Given the gender segregation of many of the jobs (men in physical plant, women as secretaries and clerks), they know mostly their own situation relative to others of the same gender. Secretaries recognize they are poorly paid, but rarely see this as a gender issue, since most secretaries they know, both in the university and outside, make similarly low salaries.

What is perhaps surprising in these questions about gender discrimination is how many employees say they "don't know" or have "no opinion" about these matters. These are employees who took the time to respond to a seven to nine page questionnaire distributed by the Status of Women Committee. Presumably the non-respondents were even less interested in these issues. Those who wish to change the structures that create inequities will first have to make employees as well as employers aware of the extent of the problem.

A final question in the surveys dealt with sexual harassment (see Table 6E). Again more women than men report having personally experienced harassment (38% versus 11% among the faculty, and 23% versus 10% among the non-academic staff). Both faculty and staff report a range of harassments ranging from verbal comments to unwanted touching and explicit sexual advances. While women faculty report proportionately more of these incidents, non-academic employees are often more vulnerable, especially if the

"harasser" is one's supervisor. Probationary employees among the non-academic staff are the most vulnerable of all. The formal and informal terms of employment for the non- academic employees explicitly state that there can be no challenge or appeal if a probationary employee is dismissed or disciplined. Since they rely so heavily on an acceptable rating from their supervisors, probationary employees are in no position to resist advances from those in positions of power.

CONCLUSION

This paper has examined information from one small university in the Atlantic region of Canada. These data allow a comparison between faculty and non-academic staff, and between men and women within categories of employees. Several status of women studies have documented the gender discrimination faced by faculty at different Canadian universities. This analysis has shown that men and women faculty have more benefits, higher salaries and better working conditions than their non-academic colleagues, with the possible exception of those who have made their way into administration.

Women in the non-academic sector are doubly disadvantaged. They tend to be in the lower paid, more restricted secretarial-clerical positions. Regardless of the employee group in which they find themselves, they are at the low end of the wage and benefit continuum.

The consistency of the gender difference within and across employee groups is striking. Women are paid less, have less access to promotions, have less say in the decision-making process at the university than do men. The "employee groups" that influence policy are the administrators, the managers, and, to a lesser extent, the faculty. There are no women in the senior administration, none as senior managers, and only one Dean. Women are a minority in the faculty and are concentrated at the lower, less influential ranks.

These employees all have the same employer. The same Board of Governors sets the policies, negotiates the contracts, makes the administrative appointments. What is more, the money for salaries and other benefits, such as paid leaves, for all employees comes from the same pot. Advantages that faculty have been able to negotiate may well be at the expense of the non-academic support staff.

If gender equity is to be achieved by university faculty it will require a change in the structures that allow inequities to develop and persist, as well as a change in attitude by those who set policies. It is to be hoped that a change in attitude would benefit all employees, academic and non-academic alike. Those who propose equity structures should be careful that the provisions of this structure create a fair working environment for all employees, not just the highly visible faculty.

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Detecting Gender Discrimination in University Salaries: A Case Study*

LEORA C. SWARTZMAN, CLIVE SELIGMAN, & WILLIAM J. McCLELLAND

The University of Western Ontario

Abstract

To assess sex discrimination in university salary allocation accurately, one must determine whether gender explains the salary difference in and of itself, or exerts its influence through other variables, such as rank and departmental affiliation, that themselves affect salary and may correlate with gender. Using members of the Faculty of Social Science ($\underline{N}$ = 133) of a large Canadian university as a case sample, we assessed gender discrimination in promotion and gender differences in departmental affiliation as related to salary before including these two variables in statistical analyses predicting salary. No evidence was found for discrimination in promotion and women were not more under-represented in the higher-salaried departments. Several regression models recommended in the literature for assessing gender discrimination in salaries were conducted and yielded convergent findings: male and female faculty similar on salary-relevant variables were equivalently paid. While these results should be reassuring, they would not go very far toward resolving salary discrimination disputes in the university studied or in most other academic institutions. The difficulties of applying the results of statistical analyses within a politically-charged arena are discussed.

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Résumé

Afin d'évaluer avec précision le degré de discrimination sexuelle dans l'allocation des salaires universitaires, on doit déterminer si le sexe en soi explique la différence salariale ou s'il exerce son influence par l'intermédiaire d'autres variables, telles le range et les affiliations départementales, qui influencent elles-mêmes les salaires et qui pourraient être en corrélation avec le sexe. Prenant comme échantillon représentatif le corps professoral de la faculté des sciences (N = 133) d'une grande université canadienne, on a évalué la discrimination sexuelle dans l'avancement et les différences sexuelles dans les affiliations départementales se rapportant aux salaires avant d'inclure ces deux variables dans les analyses statistiques pouvant predire les salaires. On n'apporte aucun appui à l'existence de discrimination dans l'avancement et le nombre de femmes affiliées aux départements dont les salaires sont plus élevés n'est pas inférieur. Plusieurs modèles de régression recommandés dans la documentation concernant l'évaluation de la discrimination sexuelle ont été effectués et on produit des résultats convergents: qu'il s'agisse d'hommes ou de femmes, les professeurs qui correspondaient de façon semblable aux variables se rapportant aux salaires étaient rémunérés des façon égale. Tandis que ces résultats devaient être rassurants, on observe qu'ils n'aideront pas beaucoup à résoudre les disputes sur la discrimination salariale dans la plupart des institutions académiques y compris la nôtre. Sont abordées les difficultés d'appliquer les résultats d'analyses statistiques dans un milieu très politisé.

Over the past two decades, concern about sex discrimination within institutions of higher education has increased (Kahn & Robbins, 1985). The focus of most research on sex discrimination in academe has been on salary allocation (e.g., Pezzullo & Brittingham, 1979; Schau & Heyward, 1987; Schrank, 1977, 1985). The analyses consistently show that female faculty earn approximately 82% to 88% of what males earn. Moreover, there is little indication that this gap has diminished appreciably over time. For example, in 1975, the median salary of all Canadian full-time female academics was 82% that of men; in 1985, females earned 81% of what males earned (Hollands, 1988).

The finding of gender differences in average salaries is not evidence itself of sex discrimination in this realm. To assess sex discrimination in salary allocation accurately, one must determine whether gender explains the salary difference in and of itself, or whether it exerts its influence through other variables that themselves affect salary and correlate with gender. Typically, gender bias is said to exist (e.g., Morse, 1979) if gender accounts for a significant proportion of the variance in salary after the effects of other variables have been statistically controlled. Considerable attention has been directed at how best to accomplish this statistical control (e.g., Carter, Das, Gamello, & Charboneau, 1984; Johnson, Riggs, & Downey, 1987; McLaughlin, Zirkes, & Mahan, 1983; Pezzullo & Brittingham, 1979; Schau & Heyward, 1987; Shrank, 1977).

Initially, linear regression was widely used to detect gender bias in salary allocation (e.g., Lassiter, 1983; Morse, 1979). In this data analytic approach, salary is the criterion variable and those variables expected to influence salary are the predictors. Gender, coded as a dummy variable, is entered into the equation last. The variance in salary accounted for by gender *after* all other variables have been entered into the regression provides an estimate of gender bias. Furthermore, examining the actual *versus* predicted salaries (the latter based on a regression equation derived from all predictors *except* gender) of males and females yields a dollar value estimate of how much females are under or over-compensated relative to their male colleagues.

In more recent years, concerns have been raised about this approach, and, in response, variations in the regression approach have been considered. For example, it has been shown (Johnson et al., 1987; Schau & Heyward, 1987) that one's estimate of gender bias is influenced by whether the prediction equation is based on the data of all faculty (as is typically the case) or is based on the data of only male faculty. Conceptually, the latter approach seems to provide a better gauge of salary equity; it enables one to assess whether female faculty, who are equivalent to their male colleagues on all salary relevant variables and equivalent with respect to the monetary value of each variable unit, are paid more or less than predicted by the male-derived equation.

Another concern voiced repeatedly over the past several years (Johnson et al., 1987; McLaughlin et al., 1983; Schau & Heyward, 1987) is how to interpret regression weights when gender and other predictors are intercorrelated (i.e., muticollinearity) and how best to control statistically for this correlation. The issue centres around the presumed reason for the correlation between gender and the other predictor variables. Using rank as an example: if men and women are equally likely to be promoted (i.e., there is no discrimination in promotion), then arguably, rank is a useful predictor. This is because removing the effects of rank on salary controls for the possible unequal distribution of men and women at the various ranks. If, however, male faculty are unfairly advantaged in promotions, then rank is a "tainted" (i.e., sex-biased) predictor, and its inclusion in the regression equation will underestimate the salary bias against women because it accounts for some of the variability in salary that otherwise would be associated with gender.

Another predictor that may correlate with both salary and gender is departmental affiliation. There is at least circumstantial evidence that this may be the case. First, there are recognized salary differences across disciplines (Tuckman, 1979). Second, there is considerable variability in the proportion of women across disciplines. This, then, raises the question of whether departmental affiliation is a useful or misleading predictor of salaries. If various disciplines are paid differently because of market conditions, it would be proper to include department as a predictor of salary. If, however, academic work done by women is devalued (as suggested by Lott, 1985), then part of the difference in salary between a male-dominated department and a female-dominated one is due to prejudice and discrimination; this would be masked in the regression model that includes department as a predictor.

Accordingly, in the case study we present below, using data from one faculty in one university, we first assessed gender discrimination in promotion and gender differences in departmental affiliation as they relate to salary. We then tested for gender discrimination in salary using multiple regression analyses as described earlier.

METHOD

Subjects

The sample consisted of all assistant and associate professors in the Faculty of Social Science at the University of Western Ontario in 1988/89. The Faculty is composed of seven departments and one centre. Of the 133 faculty, 107 (80.5%) were male and 26 (19.5%) were female. The mean (M), median (MDN), and standard deviation (SD) for the variables of interest are presented (by rank and gender) in Table 1. Full professors were excluded from the study because female faculty at this rank were too limited in number (i.e., n = 2).

Procedure

Data for each faculty member were coded by the Associate Dean. To preserve confidentiality, individual faculty were assigned subject numbers and data were entered and analysed by personnel in the Social Science computer laboratory. Moreover, only personnel in the Dean's office and the computer laboratory had access to the raw data.

The variables included in the analyses were: 1) salary, 2) gender, 3) age, 4) rank, 5) years in rank, 6) highest degree earned, 7) years since highest degree earned, 8) years since first appointed as assistant professor at any institution, and 9) average salary of individual's department.

Ideally, we would have liked to have included merit or other ratings of performance. However, because of the difficulty in obtaining valid measures of performance, especially across departments, we did not include this variable.

RESULTS

Gender Discrimination in Promotion

A discriminant function analysis to predict rank (assistant *versus* associate professors) was conducted using the following predictors: age, highest degree, years since highest degree, years since first appointed as assistant professor, and average salary of department. The discriminant analysis correctly classified 84.1% (112 of 133) of the faculty. Of the 26 women faculty, 21 (80.8%) were classified correctly, three (11.5%) were underpredicted, and two (7.7%) overpredicted. Of the 107 men, 91 (85%) were correctly classified, twelve men (13.2%) were underpredicted, and four (4.4%) were over predicted. According to a chi-square analysis, men and women were equally likely to be correctly

Table 1

Means, Medians and Standard Deviations of Several Salary Predictors by Gender and Professorial Rank

			Males	Females
Assistant Professors	Age	M	35.90	36.94
		MDN	36	34
		SD	5.13	6.57
	Years since first appointed as assistant professor	M	5.00	4.81
		MDN	4	3
		SD	3.65	4.85
	Years since highest degree	M	5.09	5.06
		MDN	4	3
		SD	3.32	4.30
	Years in current rank	M	3.24	3.00
		MDN	2	2
		SD	3.06	2.66
	Sample Size		33	16
Associate Professors	Age	M	44.27	47.50
		MDN	42	46
		SD	8.36	7.10
	Years since first appointed as assistant professor	M	14.20	12.60
		MDN	12	10.5
		SD	6.88	7.52
	Years since highest degree	M	14.78	13.60
		MDN	13.5	11
		SD	7.67	7.43
	Years in current rank	M	8.24	5.60
		MDN	6	4
		SD	6.76	5.25
	Sample Size		74	10

classified, $X^2(j) = .63$, ns. Moreover, of those incorrectly classified, men were not more likely to be overpredicted than women, $x^2(j) = 1.72$, ns.[1]

One can further test the hypothesis that women are unfairly held back in rank, compared to men, by examining data presented in Table 1. To make the argument that women are being discriminated against, one would first have to show that women, on average, have been in rank longer than males and have had their Ph.D.s longer than males. The data, however, indicate that male and female assistant professors, on average, have been in rank and have had their Ph.D.s almost identical amounts of time. At the associate level, the results show that men have been in rank and have had their Ph.D.s longer than women, a finding which is inconsistent with the hypothesis.

We thus conclude that neither the discriminant analysis nor the data in Table 1 suggest that female faculty are treated differently than male faculty in promotion decisions.

Gender and Departmental Salary

To examine the possibility that women are under-represented in the higher paid departments, the correlations between gender (0 = female, 1 = male) and average departmental salary was calculated. The correlation ($r = .13$, $N = 133$) is not statistically significant. Moreover, the correlation between average department salary and the proportion of male faculty in a department also is not statistically significant ($r = .19$, $N = 8$ academic units in the faculty). Thus, the data do not suggest that women are concentrated in the lower-paying departments, at least for our sample.

Gender Discrimination in Salary Allocation

Next, a forward stepwise multiple regression analysis predicting salary was conducted. The model accounted for 76 percent of the variance in salary, $F(8,124) = 49.5$, $p < .0001$ (see Table 2). Gender did not account for a significant enough portion of variance even to be entered into the model. Furthermore, in a multiple regression in which the variables were entered simultaneously, gender accounted for a statistically nonsignificant amount of the variance (i.e., less than .001%) in salary.

Another way of analyzing these data is through covariance analysis. A comparison of the uncorrected mean salaries reveals that female faculty earn 87% of what males earn, a statistically significant difference, $t(131) = 2.85$, $p < .006$. When the effects of all other predictor variables are covaried out, the salary differences disappear, $t(124) = .10$, ns, with women earning 99.7% of what males earn. Indeed, one need not include all predictors to reduce the mean difference in salaries (see Figure 1). Consider, in turn, only the three strongest predictors identified by the forward stepwise regression; after correcting for years since first appointed as an assistant professor, the female portion of male salary rises from 87% to 94% (and is only marginally statistically different, $t(130) = 1.78$, $p = .08$). With a further correction for average salary of department, females earn 97.0% of what their male counterparts earn. This difference is not statistically significant, $t(129) = 1.01$, ns. With the additional correction for rank, the proportion increases to 99.7%, $t(128) < 1$, ns.

Table 2

Forward Stepwise Regression Predicting Salary.

Variable	Step	F	Incremental Variance (r^2)	Cumulative Variance (Model r^2)[a]
Years since first appointed as assistant professor	1	128.3	.495***	.495
Average salary of department	2	54.2	.143***	.638
Rank	3	41.7	.089***	.726
Years in current rank	4	12.5	.024**	.750
Highest Degree	5	5.2	.010*	.760

Note: None of the remaining variables explained additional variance

[a] The model r^2 is significant at $p < .0001$ at all five steps

* $p < .05$ ** $p < .001$ *** $p < .0001$

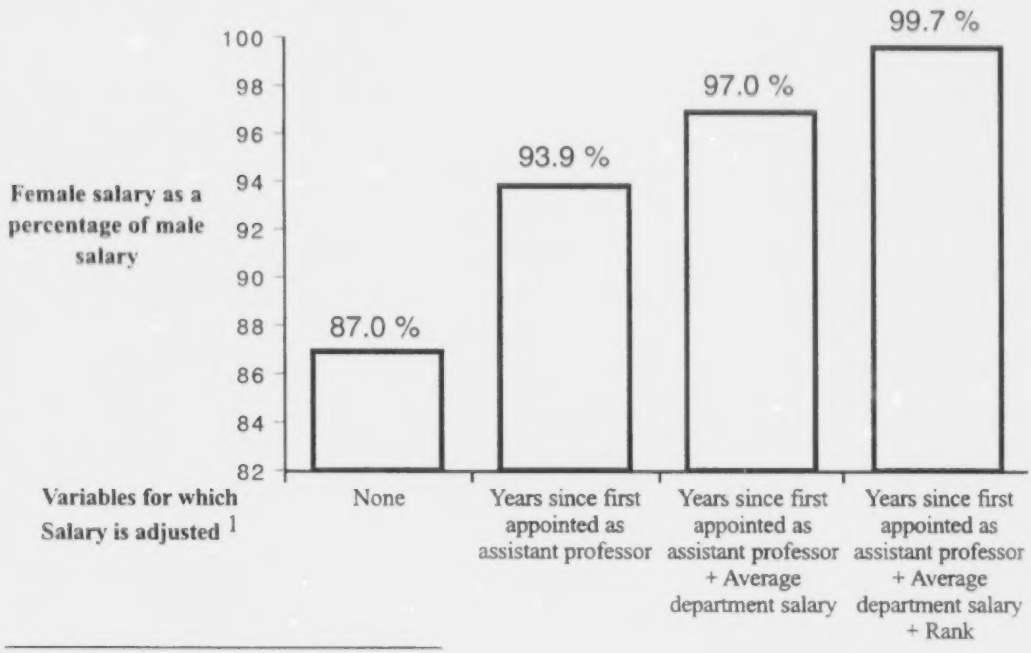
Therefore, on the basis of these analyses, one can conclude that, given the same rank, the same number of years since first appointed as assistant professor, and membership in the same department, female and male social science faculty are equivalently paid.

Actual versus Predicted Salaries Based on "All Faculty" and "Male Only" Equations

To corroborate these findings, two additional analyses were conducted. First, a multiple regression to predict salary was conducted on the entire sample, using all predictors except gender. Based on the regression equation, predicted salaries were determined for both males and females. The regression equation accounted for 76.2% of the variance in salaries, F (7, 125) = 57.0, $p < .0001$. The difference between actual and predicted salary (i.e., actual salary minus predicted salary) for men was \$21.84 (SD = \$5,877), which is not statistically different from zero, $t < 1$. The difference between actual and predicted salary for women was – \$89.91 (SD = \$4,356), which also is not significantly different from zero, $t < 1$. As might be expected, the difference between male and female difference scores, \$111.75, was not statistically significant either, $t < 1$.

Figure 1

Female salary as a proportion of male salary



[1] Salary is adjusted by covariance analyses.

Second, a regression equation to predict salaries (using the same predictors as in the prior analysis) was then determined from the male sample. The equation accounted for 75.1% of the variability in men's salaries, F (7, 75) = 58.0, $p < .0001$. This equation was used to predict women's salaries. The average difference between women's actual and predicted salaries, $36.83, is not statistically different from zero, $t < 1$. This finding is consistent with the analyses already presented.

DISCUSSION

The results of our analyses do not provide any evidence of gender bias in salary allocation or in promotional practices in the Faculty of Social Science, at least at the assistant and associate professor levels. Men and women who are similar on important salary-relevant variables are equivalently paid. The regression analyses show that an equation based on the whole sample predicts salaries equally well for male and female faculty and an equation derived from the male sample alone also predicts female salaries well. Moreover, with respect to promotional practices, the discriminant analysis predicted male

and female ranks with the same accuracy, and females' ranks were not more likely to be under or overpredicted than those of males.

We should reiterate that an important variable omitted from our analyses was merit (i.e., the calibre of academic career performance). However, some have suggested (e.g., Schau & Heyward, 1987; Scott, 1979) that merit ratings are unlikely to add very much to the explained variance in salary because variables that correlate with it, such as rank and years in rank, are already included in the regression equation. Moreover, one wonders whether any measure of merit applied across disciplines would receive wide agreement among professors.

In this investigation, gender discrimination in *both* salary and promotion was assessed separately. This approach (also see Ervin, Thomas, & Zey-Ferrell, 1984) is worth emphasizing since much recent research has focussed explicitly on gender discrimination in salary allocation alone. The concentration on salary discrimination might have arisen because pay equity legislation has provided universities with a mandate for such analyses, or because salary is more easily studied (and possibly adjusted) than other academic rewards. Nevertheless, there are compelling reasons to assess gender discrimination in the allocation of non-monetary rewards (such as promotion and type of appointment) explicitly; women are strikingly under represented in academe (within the discipline of psychology, for example), at both senior ranks and entry level positions (e.g., Emmons, 1982, Guttmann, 1985).

This unequal sex distribution has not changed much over the years, despite the fact that women have been comprising an increasing proportion of doctorate recipients (Syverson, 1982). Research is needed to determine whether this unequal sex distribution has remained unchanged because of systematic institutional barriers, personal career choices made by women, or other factors; in order to rectify the under representation of women in academe (particularly at the higher ranks), one must first understand how it has come about.

Let us be clear about what we cannot conclude from our study. Our goals are modest; we do not claim to have addressed all aspects of sex discrimination in one faculty of this university. In the present study, full professors were excluded from the analysis because there were only two female faculty at this rank. Our data do not, of course, allow us to assess why this is the case. Similarly, our study does *not* enable us to evaluate whether women are discriminated against in the hiring process. Our study does address salary discrimination among assistant and associate professors and discrimination in promotion from assistant to associate professor for those who are at the university.

A number of questions are not neatly answered through regression analysis, or any other statistical procedure. For instance, even selecting which regression models to use (e.g., the decision to include or exclude merit as a predictor) might require making assumptions in the absence of supporting evidence (Johnson et al., 1987). These assumptions may lead to increased likelihood of finding or not finding gender discrimination in

salary (Birnbaum, 1979; McLaughlin et al., 1983; Ramsey, 1979). Additionally, although it did not happen in the present case study, it' the results of different regression models conflict, on what basis does one decide which results to accept?

Even if gender discrimination in salary were clearly demonstrated by the regress ion analysis, how would one rectify this inequity? Which is the appropriate target - women as a class or individual women? Should all women (even those the regression model indicates are overpaid) receive an amount equal to the average discrepancy? Should only underpaid women (as specified by the model) have their salary raised by an amount equal to the difference between their predicted and actual salaries? Furthermore, a regression model used to identify salary inequity for women will also identify men who are underpaid. What action, if any, should be taken on their behalf. Finally, what degree of underpayment requires redress? Any underpaid amount? Only actual salaries that are one standard deviation below predicted? Those that are two standard deviations below predicted?

Perhaps we should have only modest goals for regression analyses in resolving salary discrimination disputes. Regression models may be useful to indicate whether a problem exists or not, and even to hint at the extent of the problem. But, the persuasiveness of the statistical case will be influenced by the cohesiveness, trust, and political climate that exist in the academic institution, both between administrators and faculty and between men and women. Of note, our colleagues' reactions to our results ranged from one extreme to the other. On one hand, some accused us of covering up the gender discrimination against women that truly does exist, through our choice of regression models and inclusion of "tainted" predictors. On the other hand, some felt that our failure to find a male-female salary difference demonstrated that men, in fact, were *underpaid,* since they believed males were indeed more "meritorious" (i.e., more scientifically productive) and this was not taken into account by the regression equation. Clearly, further research is needed to elaborate the role that statistical analyses can play in what is ultimately a political arena (see Dagg & Thompson, 1988), wherein perceived social reality is just as crucial as the so-called facts.

Notes

[1] This analysis should be interpreted cautiously since three cells contain fewer than five observations.

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What Should the Goals Be?
Employment Equity for Female Faculty in Canada [1]

JOHN H. BLAKELY

York University

Abstract

This paper investigates the process of setting employment equity goals and time tables for female faculty in Canadian universities. First, the paper identifies the conditions under which a goal of a 50–50 balance between men and women faculty members by the year 2000 can be achieved. Second, it identifies criteria for evaluating the reasonableness of this goal. Third, given that such criteria as external availability, impact on labour demand and fairness suggest that this goal may not be reasonable, the question becomes: what should the goals be? The paper addresses this question by analyzing the impact of alternative hiring targets (reflecting alternative assumptions about external availability) on the gender composition of faculty in the year 2000. These hiring targets range from an extremely conservative 16.8% female to an optimistic 44.4% female. Under appropriate assumptions, these yield gender composition estimates ranging from 17.5% to 35.4%. While recognizing that availability will vary, across universities, it is hoped that the estimates provided herein will inform debates on setting employment equity goals: 1) by illustrating and elaborating on a methodology for establishing goals and timetables; and 2) by providing lower-bound and upper-bound estimates (along with estimates based upon moderate assumptions) to illustrate the range of possibilities under Canadian employment equity policy.

RÉSUMÉ

Cet article porte sur le mode d'établissement d'objectifs et de calendriers relatifs à l'équité en matière d'emploi pour les professeurs féminins dans les universités canadiennes. Il définit d'abord dans quel contexte on peut réaliser d'ici l'an 2000 l'équilibre entre le nombre d'hommes et celui de femmes chez les professeurs d'université. Il établit ensuite des critères servant à déterminer si cet objectif est raisonnable. En troisième lieu, puisque des critères comme la disponibilité externe, les effets sur la demande de professeurs et la justice laissent supposer que cet objectif pourrait ne pas être raisonnable, la question devient celle-ci: quels objectifs devrait-on fixer? Le document traite de cette question en analysant les effets de différents objectifs en matière d'embauche (reflétant différentes hypothèses quant à la disponibilité externe) sur la composition d'apres le sexe du corps professoral, en l'an 2000. Ces objectifs en matière d'embauche varient d'une proportion extrêmement conservatrice de 16,8% de femmes jusqu'à une proportion optimiste de 44,4% de femmes. Des hypothèses valables nous donnent des estimations variant de 17,5% à 35,4%. Tout en reconnaissant que la disponibilité variera d'une université à l'autre, on espère que les estimations fournies permettront des discussions éclairées sur l'établissement d'objectifs relatifs à l'équité en matiere d'emploi: 1) en élaborant et en illustrant une méthodologie pour définir des objectifs et des calendriers, et 2) enfournissant des estimations extrêmes (ainsi que d'autres fondées sur des hypothèses modérées) afin d'illustrer les diverses possibilités qui s'offrent dans le cadre de la politique canadienne sur l'équité en matière d'emploi.

INTRODUCTION

There has been considerable activity in recent years directed at establishing and implementing employment equity for women in Canadian universities. Much of this activity can be traced to recent Federal Government initiatives designed to provide redress to the systemic discrimination experienced by members of certain designated target groups (including women) in our society. As Boyd (1987) points out, Canadian universities are affected by the Federal Contractors Program. This program requires employers with over 100 employees who seek to secure contracts equal to or in excess of $200,000 with the Federal Government to implement an employment equity policy. Most Canadian universities meet these size criteria and seek Federal Government contracts, and are thus very likely required to implement employment equity for women and for other designated target groups.

One dimension of the universities' responsibilities under the Federal Contractors Program is that contractors must include in their employment equity policy the "establishment of goals for the hiring, training and promotion of [female] employees." (CEIC, 1986). This issue generates considerable controversy. On one hand, the Council of Ontario Universities Handbook on employment equity for women (1988) devotes no more than one-half of one page to the question of goals and timetables and provides no specific

information on what these goals might be or how they might be decided. On the other hand, some proponents of employment equity and affirmative action have offered very precise targets and timetables. For example, in a 1988 report to the president of the University of Western Ontario and in a subsequent newspaper article, Constance Backhouse asserted that "a balance of 50–50 between men and women faculty members by the year 2000 would be a reasonable target" (*The Globe & Mail,* May 30, 1988).

The Council of Ontario Universities regards goal-setting as a consultative process whereas Backhouse regards goal-setting as essentially synonymous with setting quotas. The former relies on various types of information (including departmental priorities, current work force composition, availability in the external work force and any special measures already in place), whereas the latter relies on only one type of information — i.e., that extraordinary measures should be taken to ensure that female university faculty representation is set equal to the representation of women in the general population in as short a time period as possible. In short, the former treats the goal-setting process as being largely dependent upon organizational and environmental contingencies, whereas the latter postulates a single goal within a single timeframe which is then applied to all situations.

Between these two extremes, it is possible to identify a middle position. Specifically, it can be argued that certain analytical and methodological issues are common to most situations (see, for example, Phillips, 1985; and Harvey & Blakely, 1985) and thus that there are certain similarities in what the goals will be in various organizational settings. What varies across organizations, however, are certain organization-specific parameters. Thus, while it is not possible to postulate a single universally applicable goal, it is possible: 1) to use existing information to make assumptions about the values these organization-specific parameters may take in some future time period; 2) to vary these assumptions over a wide range of values; and 3) to perform analyses based upon these assumptions as well as existing information in order to identify lower-bound, upper-bound, and "most probable" estimates of what the representation of female faculty will be in Canadian universities in some future time period and under alternative proposals for implementing and achieving employment equity.

This paper illustrates, and discusses some implications of such an analysis. The starting point for the analysis will be Backhouse's (1988) proposal for achieving "a balance of 50–50 between men and women faculty members by the year 2000." Her proposal is being singled out for analysis because she is perhaps the first to provide specific goals and timetables — and this makes it possible to empirically evaluate her proposal. This part of the paper will identify the conditions that would have to be in place in order for Backhouse's goal to be achieved, and then it attempts to define criteria for evaluating the reasonableness of this goal. The next section is based on the premise that these conditions may not be reasonable. Given this, +,he question becomes, what should the goals be? The paper addresses this question by defining alternative scenarios for the future, and by projecting the gender composition of female faculty in Canadian universities under each of these scenarios. These scenarios represent a range of conditions which likely encompass

lower-bound and upper-bound estimates of what the future will look like, as well as some "more probable" estimates. It is hoped that this analysis of what the goals should be will inform debates among academics and policy-makers who are most familiar with the constraints and opportunities for achieving equity for women in a university setting.

REASONABLENESS OF A 50–50 BALANCE BY THE YEAR 2000

Backhouse's proposal and assumptions of the analysis

Backhouse's objective is to achieve 50–50 balance in the gender composition of faculty in Canadian universities by the year 2000. She would achieve this objective by increasing the proportion of newly hired female faculty to all faculty hires to a level that is somewhat above 50%. Specifically, she makes three proposals. First, 50% of replacement hires over the 1985–2000 period (the period of her analysis) would be women. Second, 50% of any new hires would be women. Third, she proposes an affirmative remedy to redress the discriminatory implications of the "almost impenetrable job security to a male dominated faculty" provided by the institution of tenure. She suggests that faculty be subject to a five year review process in which those who do not measure up to an adequate standard of research, teaching and administrative work would be dismissed. She proposes, moreover, that the vacated positions should be filled only by women.

Given this proposal, the extent to which the proportion of female faculty hires to all faculty hires is greater than 50% depends upon the severity of her proposed tenure review process. If a small proportion of the existing stock of faculty fails this tenure review process, attrition rates would be relatively low and the proportion of female faculty hires would be only slightly above 50%. If a large proportion of the existing stock fails this tenure review process a large number of positions reserved exclusively for women would open up and the proportion of female faculty hires would be significantly above 50%.

This evaluation of Backhouse's proposal makes four sets of assumptions. First, the study assumes that there are no significant differences between men and women in retirement behaviour, in the decision to leave academia before the cc normal" retirement age, or in the achievement of tenure. These assumptions are invariant across each scenario. This, in turn, allows us to analyze the independent effects of alternative hiring targets on the gender composition of Canadian university faculty in the year 2000, controlling for the effects of retirement and tenure decisions on the gender composition of Canadian university faculty.[2]

Second, given the assumption that there are no significant gender differences in retirement and turnover, the study makes alternative assumptions about the nature and extent of faculty turnover. Specifically the assumptions about faculty turnover (which is defined for the purposes of this study as the decision to leave academia) range from a "no-attrition" assumption to a 15% attrition assumption. The no-attrition assumption states: 1) that everyone retires at age 65; and 2) that no one leaves academia before they reach the age of 65. The 15% attrition assumption states: 1) that everyone retires at age 65; and

2) that over each five-year period between 1985 and 2000, 15% of the stock of university faculty who do not reach retirement age during that five-year period leave academia. The most probable attrition rate over the 1985–2000 period is likely to be somewhere between these two extremes. However, by varying the attrition assumptions over a relatively wide range, it is possible to assess the implications of any proposal to increase the attrition rate by replacing the institution of tenure with a periodic tenure-review process. [3]

A third set of assumptions pertains to the actual availability of women for faculty positions. This issue does not enter directly into the evaluation of Backhouse's proposal, but it is discussed in some detail in the latter part of the paper.

Fourth, assumptions need to be made about the nature and amount of new and replacement faculty hiring over the 1985–2000 period. Specifically, for new hires, the paper assumes that the recent past is the best predictor of the near future. Over the past few years, an average of 375 new faculty positions have been created each year. This analysis assumes that 375 new faculty positions will be created each year between 1985 and 2000. For replacement hires, the paper assumes that there is a one-to-one correspondence between retirements/attrition and replacement hires — that is, for each person who retires or leaves academia, someone is hired in their place. It should be acknowledged that some forecasters (e.g., von ZurMuehlen, 1987) believe that replacement hires will be somewhat lower than the retirement/attrition rate and that new faculty hires may drop below traditional levels. Given that these issues are open to debate (see also, NSERC, 1985; SSHRC, 1985), the principal rationale for these assumptions is that they are simplifying assumptions, and that alternative assumptions have relatively little bearing on the principal findings of this study.

Main Estimates

Using data on the age and gender composition of Canadian university faculty in the 1985–86 academic year (the most recent year for which data are available), the question to be answered is what proportion of vacancies created between 1985 and 2000 under this staffing policy would have to be filled by women in order to achieve a 50–50 gender balance by the year 2000?

This question can be answered in two steps. The first involves subtracting the number of university professors who are expected to leave academia between 1985 and 2000 from the existing stock and adding the number of university professors who are expected to enter academia between 1985 and 2000 to the existing stock. Tables 1 and 2 present this analysis. Table 1 shows the actual age and gender composition of professors employed full time in Canadian universities in 1985. The table also projects the age and gender composition of the population for each five-year interval to the year 2000 under two assumptions: 1) that everyone retires at age 65; and 2) that no one leaves academia before they reach the age of 65. The bottom row of the table shows the number of the 1985 stock of male and female faculty members who are expected to still be in academia in the year 2000 under

Table 1

Current and Projected Stock of Full-time Canadian University Faculty by 5-year Age Groups

Age	Year											
	1985–86			1990–91			1995–96			2000–01		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total
< 25	23	15	38	0	0	0	0	0	0	0	0	0
25-29	462	250	712	23	15	38	0	0	0	0	0	0
30-34	2,139	781	2,920	462	250	712	23	15	38	0	0	0
35-39	4,197	1,171	5,368	2,139	781	2,920	462	250	712	23	15	38
40-44	6,115	1,226	7,341	4,197	1,171	5,368	2,139	781	2,920	462	250	712
45-49	5,731	897	6,628	6,115	1,226	7,341	4,197	1,171	5,368	2,139	781	2,920
50-54	4,437	576	5,013	5,731	897	6,628	6,115	1,226	7,341	4,197	1,171	5,368
55-59	3,106	518	3,624	4,437	576	5,013	5,731	897	6,628	6,115	1,226	7,341
60-64	1,982	295	2,277	3,106	518	3,624	4,437	576	5,013	5,731	897	6,628
65+	311	40	351	0	0	0	0	0	0	0	0	0
Total	**28,503**	**5,769**	**34,272**	**26,210**	**5,434**	**31,644**	**23,104**	**4,916**	**28,020**	**18,667**	**4,340**	**23,007**

Source for current data: Statistics Canada, *Teachers In Universities* (Ottawa, ON: Supply and Services Canada, 1985-86).

Table 2

Projected Stock of Full-time Canadian University Faculty, Assuming 50% Hiring Targets for Replacements of Retirees and of New Hires

		Male	Female	Total	% Female
A.	1985 stock of faculty members	28,503	5,769	34,272	16.8
B.	Stock of 1985 faculty members expected to still be teaching in 2000	18,667	4,340	23,007	18.9
C.	Difference (A–B)	9,836	1,429	11,265	12.7
D.	Replacement hires 1985–2000 reflecting hiring target of 50% female	5,632	5,633	11,265	50.0
E.	2000 stock of faculty members reflecting survival of 1985 stock and replacement hires (B+D)	24,299	9,973	34,272	29.1
F.	New hires 1985–2000 reflecting a hiring target of 50% female (and assuming 375 new hires/year)	2,813	2,812	5,625	50.0
G.	2000 stock of faculty members reflecting survival of 1985 stock, replacement hires and new hires (E+F)	27,112	12,785	39,897	32.0
H.	Total hired	8,445	8445	16,890	50.0
I.	Gender composition of hires needed to achieve 50-50 gender composition by the year 2000	1,281	15,609	16,890	92.4

the given assumptions. For example, of the 28,503 male faculty members in 1985, 18,667 of them are still expected to be teaching in the year 2000; of the 5,769 female faculty members in 1985, 4,340 of them are still expected to be teaching in the year 2000.

Table 2 shows the impact of 50% female hiring targets for replacement hires and new hires in the gender composition of university faculty in Canada in the year 2000. Rows A and B show the gender composition of the 1985 stock of faculty members in 1985 and 2000. The far right entries in rows A and B show that the natural attrition of the 1985 stock of faculty members in itself accounts for an increase in the proportion of female faculty — from 16.8% to 18.9%.

Row C shows that 11,265 replacement vacancies are expected to arise (under the given assumptions and assuming that all replacement vacancies are filled) from the existing stock of 34,272 faculty members. If, as the target states (row D), 50% of replacement hires are women, this will have the effect of adding over 5600 new female faculty members to the 4,340 of the 1985 stock who are expected to survive to the year 2000. As the far right cell of row E shows, this implies an increase in the proportion of female faculty from 18.9% (row B) to 29.1 %.

Given the assumption that 375 new faculty positions will be created each year between 1985 and 2000, 5,625 new faculty positions will be created over the 1985–2000 period. If, as shown in row F of Table 2 a 50% female hiring target for new faculty positions is achieved, another 2,812 women will be added to the projected stock of female faculty. As the far right cell of row G shows, this increases the proportion of female faculty from 29.1% (row E) to 32.0%.

In total, Table 2 shows that under the given assumptions and 50% female hiring targets for replacement hiring and new hiring, the gender composition of female faculty will increase from 16.8% in 1985 to 32.0% in the year 2000. Put another way (row 1), a 50–50 gender composition may be achieved by the year 2000 if the 50% hiring rules were abandoned in favour of a rule whereby 92.4% of all faculty positions were filled by women.

It is possible, however, to move closer to a 50-50 balance in the stock of faculty in the year 2000 by making policy decisions that accelerate the rate of attrition among the 1985 stock of faculty members and/or by increasing the proportion of female hires. This is where Backhouse's affirmative remedy comes in. Her proposal was to replace the process of granting tenure with a five-year review process where those who do not measure up to an adequate standard of research, teaching and administrative work would be dismissed from their faculty positions. Moreover, the proposal suggests that vacancies created in this way should be filled only by women. The second step of the analysis, therefore, is to evaluate the proportion of females that would be hired and the gender composition in the year 2000 under alternative attrition assumptions, to see what combination of female hires and attrition rates bring us close to a 50–50 gender composition in the year 2000. Again, this assumes that all vacancies created by the current stock of faculty failing this proposed five-year review process are filled by women.

Table 3 presents this analysis under two different assumptions about the attrition rate — a 10% attrition rate for each five-year period for the 23,007 academics who will not have retired by the year 2000, and a 15% attrition rate.[4] In order to clearly show that the analysis in Table 3 is a continuation of what was presented in Table 2, the labelling of the rows starts from where Table 2 left off (i.e., rows J to C'). The calculations are derived from the data in Table 1, given the assumptions presented in the body of the paper. Sample calculations and verbal descriptions of the methods of calculation are presented in the Appendix.

Looking first at the impact of a tenure review process that induces a 10% attrition rate for each five-year period, the representation of female faculty in the year 2000

Table 3

Projected Stock of Full-time Canadian University Faculty, Assuming Hiring Targets for Women of 50% for Vacancies Arising From Replacements of Retirees and of New Hires and of 100% for Vacancies Arising From Attrition From the Current Stock of Faculty

	Attrition rate							
	10%				15%			
	M	F	Total	%F	M	F	Total	%F
J. Stock of 1965 faculty expected to still be teaching in 2000	13,608	3,163	16,771	18.9	11,464	2,666	14,130	18.9
K. Difference (B-J)	5,059	1,177	6,236	18.9	7,203	1,674	8,877	18.9
L. Replacement hires for faculty expected to fail 5-year review	0	6,236	6,236	100.0	0	8,877	8,877	100.0
M. Replacement hires for faculty expected to fail 5-year review, expected to still be teaching in 2000	0	5,592	5,592	100.0	0	7,479	7,479	100.0
N. Replacement hires for 1985–90 cohort of replacement hires who are expected not to survive to 1990–95	115	115	230	50.0	259	259	518	50.0
0. Replacement hires for 1990-95 cohort of replacement hires (N) expected not to survive to 1995–2000	11	12	23	52.2	39	39	78	50.0
P. Replacement hires for 1985-90 cohort of replacement hires expected not to survive to 1995-2000	104	103	207	49.8	220	220	440	50.0
Q. Replacement hires for 1990-95 cohort of replacement hires expected not to survive to 1995-2000	103	104	207	50.2	220	220	440	50.0
R. Replacement hires for retirees 1985–2000 expected to still be teaching in 2000	5,202	5,202	10,404	50.0	4,996	4,996	9,992	50.0
S. Replacement hires for 1985–90 cohort of replacements for retirees expected not to survive to 1990–95	131	132	263	50.2	197	197	394	50.0

Table 3 (cont.)

	Attrition rate							
	10%				15%			
	M	F	Total	%F	M	F	Total	%F
T. Replacement hires for 1990–95 cohort of replacement hires (S) expected not to survive to 1995–2000	13	13	26	50.0	29	30	59	50.8
U. Replacement hires for 1985–90 cohort of replacement for retirees expected not to survive to 1995–2000	118	118	236	50.0	168	167	335	49.9
V. Replacement hires for 1990–95 cohort of replacements for retirees expected not to survive to 1995–2000	181	181	362	50.0	272	272	544	50.0
W. New hires 1985–2000 expected to still be teaching in 2000	2,540	2,540	5,080	50.0	2,412	2,412	4,824	50.0
X. Replacement hires for 1985–90 cohort of new hires expected not to survive to 1990–95	94	94	188	50.0	140	141	281	50.2
Y. Replacement hires for 1990-95 cohort of replacement hires (X) expected not to survive to 1995–2000	10	9	19	47.4	21	21	42	50.0
Z. Replacement hires for 1985-90 cohort of new hires expected not to survive to 1995-2000	84	85	169	50.3	120	119	239	49.8
A' Replacement hires for 1990-95 cohort of new hires expected not to survive to 1995-2000	94	94	188	50.0	140	141	281	50.2
B' Stock of 2000 faculty reflecting attrition assumptions, survival of 1985 stock, replacement hires, new hires and replacements for replacements and new hires	22,374	17,523	39,897	43.9	20,608	19,289	39,897	48.3
C' Total hired	9,503	15,741	25,244	62.4	10,270	19,148	29,418	65.1

increases from 32.0% (row G in table 2) to 43.9% (row B^1 in table 3). This is the result of a policy whereby the 6,236 members of the 1985 stock of university faculty who do not reach age 65 by the year 2000 (5,059 men and 1,177 women) and who fail the tenure review process are replaced by women. Some of these women will in turn fail the 5-year review process (e.g., 10% of the cohort of 1985–90 hires may not survive the 1990–95 review, and 10% of the remaining survivors may not survive the 1995–2000 review). Since, however, the policy presumably redresses past discrimination inherent in the tenure granting process (and not expected discrimination in the future) the analysis assumes that replacements for these replacements will be hired on the basis of a 50–50 gender breakdown. Similarly, replacements for the new hires and replacements for the retirees' replacements are assumed to be hired on the basis of a 50–50 gender breakdown.[5] Under these conditions, a gender composition of 43.9% female will be achieved by the year 2000. Moreover, 62.4% of all faculty positions that open up between 1985 and 2,000 will be filled by women (row C^1). 25,244 different people (9,503 men and 15,741 women) will have filled faculty positions for at least one five-year period between 1985 and 2000 — 23,126 of them ($B^1 - J$) will be part of the stock of faculty members in the year 2000.

The right hand side of table 3 performs the same analysis, this time assuming an attrition rate for each five-year review process of 15%. Again, the hiring policy implies that members of the 1985–86 stock of faculty who do not reach age 65 by the year 2000 and who do not survive the five-year review processes are replaced by women. Replacements for the new hires and for the retirees' replacements who do not survive the five-year review processes are hired on the basis of a 50–50 balance of men and women. Under these conditions, a gender composition of 48.3% female will be achieved by the year 2000. Moreover, 65.1% of all faculty appointments between 1985 and 2000 will be filled by women (row C^1). 29,418 different people (10,270 men and 19,148 women) will have filled faculty positions for at least one five-year period between 1985 and 2000. Of those, 25,767 will be part of the stock of faculty members in the year 2000.

The analysis of these two scenarios suggests that a target of a 50–50 balance in the gender composition of university faculty by the year 2000 is theoretically possible. It can be achieved either by increasing the proportion of women hired to well over 50% over the 1985–2000 period, by increasing the attrition among the 1985–86 stock of faculty members who do not reach normal retirement age by the year 2000, or some combination thereof. The question is whether this target is reasonable in light of the staffing (hiring, firing) policies that would be required to achieve these targets. The question can be answered by considering the following criteria:

1. What is the availability (both current and future) of female faculty in the general population? This point has been hotly debated. Can *current* availability be represented by the proportion of women currently employed in full-time faculty positions, by the proportion of the flow of recent doctoral graduates who are women, by the proportion of recent doctoral enrollments who are women, or by some combination thereof?

Von Zur-Muehlen (1987) notes, moreover, that only two thirds of the entry positions likely to open in the near future will require doctoral qualification (although at least some of these positions may require completed doctorates later). This suggests that availability estimation processes should also take account of the availability of women in related jobs and occupations.

With respect to future availability, there is somewhat less debate. Employment equity analysts generally assume that availability in the longer term will be somewhere around 50%. If we assume, however, that long-term availability is 50%, it must still be decided how quickly hiring targets should and could move towards these long-term availability assumptions. That is, should a 50% hiring target be established immediately for all future hires? Should a 50% hiring target be phased in over a four or five year period — representing the minimum amount of time that would be required to graduate a cohort of graduate students who have been selected into graduate school on the basis of a 50–50 gender composition? Or should a 50% hiring target be phased in over an even longer period?

2. What are the implications of the alternative staffing policies on the overall demand for university faculty? A comparison of the total number of hires under the no attrition assumption in Table,2 and the 10% and 15% attrition assumptions in Table 3 shows that the proportion of women in faculty positions can be increased by increasing the number of opportunities that are available to men and women. Under the 0 attrition assumption, 16,890 people are expected to be hired into faculty positions. However, that increases to 25,244 under the 10% attrition assumption and 29,418 under the 15% attrition assumption. If, as von Zur-Muehien (1987) predicts the supply of doctoral degrees (including Canadians returning from abroad) is 1,500 degrees awarded each year, then a total of 22,500 new doctorates will be available over the 1985–2000 period. Therefore, the effect of an employment equity policy which increases opportunities by increasing attrition could be to change the longer-term supply-demand outlook from a projected surplus (i.e., 22,500 new doctorates vs. 16,890 new hires) to a shortage 22,500 vs. 25,244 or 29,418. It should be noted, moreover, that any shortages could be much more severe than these figures indicate, since it has been estimated that perhaps one-half of all new doctorates are actually available for university teaching (von Zur-Muehlin, 1987). Finally, it should be noted that the shortages for female faculty may be most severe because non-university employers, with their own employment equity programs, may be competing for the availability of female doctorates.

3. What are the implications of the variation in the gender composition of faculty members across disciplines on the overall hiring targets? As Table 4 shows, the gender composition of female faculty in 1985–86 varies from a low of 2.3% in engineering and applied sciences to a high of 25.9% in education. Our analysis, on the other hand, suggests than an overall hiring

Table 4

Gender Composition of Full-time Faculty Members by Field of Study

	Male	Female	Total	% Female
Education	2,257	787	3,044	25.9
Fine and applied arts	1,117	342	1,459	23.4
Humanities	4,474	1,177	5,651	20.9
Social sciences	7,181	1,376	8,559	16.1
Agriculture and biological sciences	1,955	385	2,340	16.5
Engineering and applied science	2,597	60	2,657	2.3
Health professions	4,346	1.316	5,662	23.2
Math and physical sciences	4,377	254	4,631	5.5
Not reported	211	78	289	27.0
Total	**28,515**	**5,777**	**34,292**	**16.8**

Source: Statistics Canada, *Teachers In Universities* (Ottawa, ON: Supply and Services Canada, 1985-86).

target in excess of 65% is necessary to achieve a 50-50 gender composition by the year 2000. If we set an overall female hiring target of 65% and if we grant that it will take longer to achieve this target in some disciplines than in others, then the overall target can be achieved only by setting targets in some disciplines that are well over 65%.

4. What are the implications of hiring targets that exceed availability on the fairness of the employment equity policy? We can draw on the American experience with equal employment opportunity and affirmative action to argue that quotas that are substantially higher than external availability may be an appropriate remedy to extreme and persistent forms of employer discriminatory practices (e.g., Arnold vs. Ballard, 1975; Commonwealth of Pennsylvania vs. O'Neill, 1972). However, they are likely to be considered appropriate only for relatively short, limited time periods. For example, the widely cited case of AT&T's consent decree mandated hiring targets that exceeded external availability in certain occupations for a fixed five year period (Wallace, 1976). In the case of university faculty, however, a 50–50 gender balance will be achieved by the year 2000 only by setting hiring targets that exceed availability for at least a 15-year period. If we grant that the principle of affirmative remedies is an appropriate response to persistent and extreme discriminatory employer behaviour, it still must be determined whether it is appropriate in practice over extremely long periods of time.

ALTERNATIVE SCENARIOS

The analysis suggests it is at least theoretically possible for a 50–50 gender composition to be achieved by the year 2000. The reasonableness of this goal, however, depends upon several factors. First, while the fact that hiring targets would have to exceed availability estimates does not in itself mean that the goal is unreasonable, it must be decided how much hiring targets can exceed external availability and over what time period affirmative measures should be allowed. That is, the reasonableness of a 65% hiring target may depend in part upon whether external availability is in the 50% range or in the 20% range. As hiring targets exceed external availability by greater amounts, the more difficult (and less desirable) it is to sustain these affirmative measures over the longer term. Second, while policies which accelerate the attrition of the existing stock of faculty would appear to be particularly effective in equalizing the gender composition, it should be noted that most forecasts suggest that we are entering into a period of faculty shortages (SSHRC, 1985; NSERC, 1985). In the context of faculty shortages, it may not be desirable to overemphasize policies which promote attrition. Third, while it indeed may be feasible to achieve a 65% hiring target in some disciplines, it clearly isn't feasible in others. It does not seem appropriate to increase the hiring targets in some disciplines beyond 65% in order to compensate for those disciplines where the target clearly isn't feasible.

If, however, a 50–50 gender balance by the year 2000 is not a reasonable target, then the question is, what should the goals be? This question is open to intense debate. This is the case particularly because there is little consensus on the nature of current and future availability, nor is there any consensus over what the rate of attrition among the existing stock of university faculty ought to be. We can begin to answer this question, however, by defining alternative feasible hiring targets and predicting their impact on the gender composition of university faculty in the year 2000.

The following analysis focuses on six different hiring targets reflecting six different scenarios with regard to the availability of female faculty over the 1985–2000 period. Ranging from lowest to highest these are: 1) the assumption that availability over the 1985–2000 period is equal to the current stock of female faculty; 2) the assumption that availability is equal to the current proportion of new doctorates who are female; 3) the assumption that availability is equal to the current proportion of full-time doctoral enrollments who are female; 4) the assumption that availability is equal to a weighted average of entry level and senior hires reflecting rapid increases in entry-level and senior availability over the 1985–2000 period; 5) the assumption that availability is equal to a weighted average of entry level and senior hires reflecting rapid increases in entry-level and senior availability over the 1985-2000 period, as well as a broader definition of the applicant population; and 6) the assumption that availability is equal to a weighted average of entry level hires reflecting a rapid increase in entry-level availability over the 1985–2000 period.

Scenario #1: Availability equals the current stock of female faculty. In 1985–86 (the most recent year for which data are available), 16.8% of full-time faculty in Canadian universities were female. This scenario suggests that the only hiring target that universities should be required to achieve is that the proportion of female hires should be no lower than the proportion of female faculty in the current population. This is an extremely conservative scenario. It assumes that the external labour market does not reflect gender bias — merely that the staffing policies of individual universities which employ women in fewer than 16.8% of full-time faculty positions may reflect bias against women. Analysts of the enforcement mechanisms of Canadian employment equity policy have suggested that only individual employers which are substantially below the average of all employers on the basis of these stock comparisons' may be deemed not to be in compliance with relevant anti-discrimination laws (Bevan, 1987).

The projections based upon this scenario (and all other scenarios) are presented in Table 5. They show that this scenario could in fact promote greater inequality against women. Under the 0% attrition assumption, the gender composition of female faculty declines from 18.9% to 18.0%; under the 10% and 15% attrition assumptions, the gender composition declines to 17.7% and 17.5% respectively. This occurs because the flow of faculty hires (i.e., of younger, more mobile faculty who are more likely to be looking for jobs and to be hired) clearly reflects a much higher proportion of female faculty than the existing stock. The practical implication of this scenario is that availability standards could conceivably be set too low. That is, it is conceivable that availability defined in terms of this scenario may in effect allow discriminating employers to continue to discriminate against women, and thus to promote greater inequality against women.

Scenario #2: Availability equals the current proportion of new doctorates who are female. In 1985–86, 26.4% of all persons who successfully completed doctoral programs in Canada were female. This scenario suggests that the hiring target should be no lower than the current proportion of female doctorates. Since one may reasonably expect that the proportion of new female doctorates will increase over the 1985–2000 period, this may be regarded as a conservative estimate of the current and future flows of faculty hires. As Table 5 shows, the effect of a 26.4% hiring target would be to increase the gender composition of female faculty in the year 2000 to 22. 1 % under the 0% attrition assumption, and to 23.2% and 23.7% under the 10% and 15% attrition assumptions.

Scenario #3: Availability equals the current proportion of full-time doctoral enrollments who are female. In 1985–86, 33.1% of full-time doctoral students in Canadian universities were female. This scenario suggests that the hiring target should be no lower than the current proportion of female doctoral enrollments. As Table 5 shows, the effect of a 33.1% hiring target would be to increase the gender composition of female faculty in the year 2000 to 24.9% under the 0% attrition assumption and to 27.1% and 28.1% under the 10% and 15% attrition assumptions respectively.

Table 5

Predicted Gender Composition of Full-time Faculty in Canada in 2001 with Hiring Targets Reflecting Alternative Assumptions about External Availability — by Attrition Rate

Scenario	Hiring target (%Female)	Attrition rate		
		0%	10%	15%
1	16.8	16.0 [1]	17.7	17.5
2	26.4	22.1	23.2	23.7
3	33.1	24.9	27.1	28.1
4	35.2	25.8	28.3	29.4
5	36.5	27.2	30.2	31.5
6	44.4	29.7	33.7	35.4

[1] The values In the table represent the projected percentage female of full-time faculty in Canadian universities in the year 2000 under alternative hiring target and attrition rate assumption5.

Scenario #4: Availability equals the weighted average of entry level and senior availability over the 1985–2000 period. This is the first of two scenarios which considers two different types of hires: 1) entry-level, which is likely to be represented by an estimate of the proportion of female enrollments; and 2) senior appointments (i.e. interuniversity transfers). Historically, entry level hires have constituted 50% of all hiring decisions (Statistics Canada, various years). For this 50%, an optimistic availability estimate was assumed (44.4%) (see scenario #6). For the other 50%, a composite availability estimate of 25.9% was derived, representing three equally-weighted components: 1) the current stock of associate professors (15.7%); 2) the current stock of assistant professors (28.9%); and 3) the current stock of doctoral candidates (33.1%) who will be ready to consider junior faculty appointments and at least one promotion by the year 2000. The weighted average of these two components is 35.2%. As Table 5 shows, this increases the gender composition of female faculty in the year 2000 to 25.8% under the 0% attrition assumption and 28.3% and 29.4% under the 10% and 15% attrition assumptions respectively.

Scenario #5: Availability equals the weighted average of entry-level and senior availability over the 1985–2000 period, reflecting a broader definition of the applicant population. This scenario considers entry level and senior hires. For each, a proportion of the hires are assumed to be drawn from the general population while the rest are drawn

from the academic job market. For the 50% of all hires that are entry level, one-half are based upon an optimistic availability estimate of 44.4% (see scenario #6) and the other half are based upon an availability estimate drawn from the general population (i.e., 50%). The weighted average availability estimate for entry-level hires, therefore, is 47.2%. For the 50% of hires that are at more senior levels 84% are based upon the composite availability estimate of 25.9% derived in scenario #4. The remaining 16% are drawn from the general population where female availability is assumed to be 50%. The weighted average for senior hires, therefore, is 29.8%. The weighted average of these two components is 38.5%. As Table 5 shows, this increases the gender composition of female faculty to 27.2% under the 0% attrition assumption, and 30.2% and 31.5% under the 10% and 15% attrition assumptions respectively.

Scenario #6: Availability equals the weighted average of entry level hires reflecting a rapid increase in entry-level availability over the 1985–2000 period. This scenario assumes that the proportion of female doctoral graduates characterizes external availability and that this proportion will increase rapidly to 50% over the 1985–2000 period. That is, this scenario assumes that it will take five years to graduate a cohort of doctoral candidates who were selected on the basis of a 50–50 gender composition. Thus, over the 1985–90 period availability is assumed to be 33.1% (based upon current enrollments); over the 1990–2000 period, it is assumed to be 50%. The weighted average availability estimate over the 1985–2000 period is 44.4%. As Table 5 shows, this increases the gender composition of female faculty to 29.7% under the 0% attrition assumption, and 33.7% and 35.4% under the 10% and 15% attrition assumptions respectively.

CONCLUSIONS

The purpose of this paper was twofold: 1) to investigate the reasonableness of a goal of a 50–50 gender balance among full-time faculty in Canadian universities by the year 2000; and 2) to investigate the impact of alternative hiring" targets on the gender composition of faculty in Canadian universities in the year 2000. The results suggest that a 50-50 gender balance can be achieved if hiring targets that are greater than 65% females are established and if policies to accelerate attrition among the current stock of faculty are implemented. An analysis of such criteria as external availability, impact on labour demand and -fairness suggests that the goal of a 50-50 gender balance by the year 2000 may not be reasonable. When alternative hiring targets which were based upon alternative definitions of external availability were considered a range of estimates of the gender composition of Canadian university faculty in the year 2000 were derived. These ranged from 17.5% under the high attrition assumption and the most conservative availability estimate to 35.4% under the high attrition assumption and the most optimistic availability estimate.

It is hoped that these projections can infonn debate over what the goals in employment equity programs in Canadian universities ought to be. The analysis shows, for example, that both upper-bound and lower-bound projections of the representation of female

faculty in the year 2000 reflect employment equity policy proposals which may not pass simple tests of reasonableness. Specifically, the lower-bound estimate (based upon an availability assumption of 16.8% female representation) appears to be a gross under-estimate of true availability. It is conceivable that any employment equity policies based upon this assumption could in fact promote even greater inequality against female faculty. On the other hand, the objective of a 50–50 representation by the year 2000 appears to be beyond reach because there is no evidence to support the contention that women are available to fill at least 65% of all faculty hiring that takes place between 1985 and 2000. Between these two extremes, however, there are some "more probable" scenarios. These reflect hiring target assumptions ranging from a conservative availability estimate of 26.4% to an optimistic availability estimate of 44.4%. These result in gender composition estimates in the year 2000 which range from 22.1 % to 35.4%.

The utility of projections such as these is that they raise more questions than they answer. Specifically, they raise questions about what policy proposals should be considered, and about the relative feasibility (and costs) associated with particular proposals and particular goals. For,example, is it feasible to increase the availability pool by practising affirmative action in graduate school enrollments as a means of increasing the proportion of female faculty hires in some future time period? Do such policies as tenure review or early retirement offer any identifiable benefits in terms of their impact on achievement of certain employment equity goals? Are they desirable? The analysis can be used to identify the constraints and range of possibilities associated with any one proposal. These can then be weighed against alternatives.

Finally, questions can be raised about the assumptions that underlie projections such as these. Given the projection methodology outlined in this paper, however, it becomes a relatively easy task to fit alternative parameter assumptions into the analysis. Indeed, as more information becomes available through debates among academics and policy-makers and through further research, it should over time become possible to make further refinements to the analysis. Specifically, as the concept of employment equity takes hold and as we learn more about the causes of, and remedies for, discrimination against women, it will also become easier to identify specific goals and timetables given the specific constraints and opportunities confronting each of our universities.

Notes

1 I would like to thank Lynne Marks and the anonymous reviewers for their comments on an earlier draft ofthis paper.

2 It should be noted that these assumptions do not have to be correct for the analysis of the reasonableness of a particular target to be useful. The assumption of gender neutrality in tenure and retirement is saying, in effect, that university employment equity policies are (or can be) effective and that the only policy issue relates to hiring policy. if, on the other hand, there is a disparate impact in tenure decisions or retirement behaviour, this increases the pressures on the hiring policy. If, for example, the hiring targets are unreasonable when we assume gender neutral tenure and

retirement patterns they will be even more unreasonable if there is a disparate impact in these areas. It should also be noted that the analysis outlined in this paper can be adapted to analyze the impact of employment equity policies in the tenure and retirement areas.

3 Of course, attrition can be enhanced in other ways — for example, by early retirement programs. The effects of alternative attrition policies are very similar to those outlined in this paper.

4 Under the 10% attrition assumption, 2,301 will fail the first review process, 2,071 will fail the second review process and 1,864 will fail the third review process. Under the 15% attrition assumption, 3,451 will fail the first review process, 2,933 will fail the second review process and 2,493 will fail the third review process.

5 If replacements for all replacements and new hires were women then the stock of male faculty members in the year 2000 would be reduced by 1,024 to 21,350 and the stock of female faculty would be increased by 1,024 to 18,547 (i.e., 46.5% of the total). This implies that 1,058 fewer men will have been hired (i.e., 8,445 rather than 9,503) and that 1,058 more women will have been hired (i.e., 16,794 rather than 15,741 — i.e., 66.5%).

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APPENDIX

Sample calculations (for females assuming 10% attrition) and description of analysis in exhibit 3

J. Stock of 1985 faculty members expected to still be teaching in 2000.

$4340 - (434 + 391 + 352) = 3163$

where $434 = (.10)(4,340)$;

$391 = (.10)(4,340 - 434)$

$352 = (.10)(4,340 - 434 - 391)$

10% of the 1985 stock of university faculty are assumed to leave academia during each five-year period — i.e., 434 between 1985–90; 391 during 1990-95; 353 during 1995–2000.

K. The number of the 1985 stock of faculty who leave academia due to the five-year review process is the number of faculty expected to be teaching under the no attrition assumption minus the number of faculty expected to be teaching under the 10% attrition assumption — i.e., Row B – Row J = 4,340 – 3,163 = 1,177.

L. Replacement hires for faculty members who failed five-year review process. 6,236 men and women are expected to leave academia due to the review process (1,177 women and 5,059 men). The hiring policy that is being evaluated assumes that all of these vacancies are filled by women.

M. Replacement hires for faculty members who failed five-year review process expected to still be teaching in 2000. Not all of the replacement hires defined in L will survive the five year review process.

Specifically:

.10 x 2,301 = 230 (see N) of the 1985–90 cohort will not survive the 1990–95 review;

.10 x 2,071 = 207 (see P) of the 1985–90 cohort will not survive the 1995–2000 review;

.10 x 1,072 = 207 (see Q) of the 1990–95 cohort will not survive the 1995–2000 review.

6,236 – (230 + 207 + 207) = 5,592.

N. Replacement hires for 1985–90 cohort of replacement hires who did not survive to 1990–95. The hiring policy that is being evaluated assumes that 50% of these hires (i.e., .50 x 230 = 115) are female.

O. Replacement hires for 1990–95 cohort of replacement hires who did not survive to 1995–2000 (i.e., .10 x 230 = 23). The hiring policy that is being evaluated assumes that 50% of these hires (i.e., 12 after rounding) are female.

P. Replacement hires for 1985–90 cohort of replacement hires who did not survive to 1995–2000. The hiring policy that is being evaluated assumes that 50% of these hires (i.e., .50 x 207 = 103) are female.

Q. Replacement hires for 1990–95 cohort of replacement hires who did not survive to 1995–2000. The hiring policy that is being evaluated assumes that 50% of these hires (i.e., .50 x 207 = 104) are female.

R. Replacement hires for retirees 1985–2000 expected to still be teaching in 2000. First, estimate the number of replacement hires in each five-year period, then estimate the attrition for each cohort:

1985-90: 34,272 – 31,644 = 2,626 (# of replacement hires)

1990-95: 31,644 – 28,020 = 3,624 (# of replacement hires)

1995 – 2000: 28,020 – 23,007 = 5,013 (# of replacement hires)

Total number of replacement hires: 2,626 + 3,624 + 5,013 = 11,265

Attrition: 2,626 – (263 – 236) = 2,129

3,624 – 362 = 3,262

5,013 = 5,013

Stock of replacement hires after taking account of attrition:
2,129 + 3,262 + 5,013 = 10,404.
50% (i.e., 5,202) are female.

S., T., U., V. — similar to N., 0., P., Q.

W. New hires 1985–2000 expected to still be teaching in 2000. For each cohort, there are 1,875 new hires. Therefore:

1985–90 cohort: 1,875 – (188 + 169) = 1,518

1990–95 cohort: 1,875 – 188 = 1,687

1995–2000 cohort: 1,875 = 1875

Stock of new hires after taking account of attrition.

1,518 + 1,687 + 1,875 = 5,080. 50% (i.e., 2,580) are female.

X.,Y., Z., A'. - similar to N., 0., P., Q.

B'. Stock of university faculty in the year 2000 reflecting attrition assumptions, survival of 1985 stock, replacement hires (and replacements for replacements and new hires):

J + M + N + P + Q + R + S + U + V + W + X + Z + A' = B'

C'. Total number of new hires: D + F + L + N + 0 + P + Q + S + T + U + V + X + Y

An Evaluation of Pay Equity Reports at Five Canadian Universities*

JAMES M. DEAN & RODNEY A. CLIFTON

The University of Manitoba

Abstract

This paper reviews five reports measuring discrimination in salaries between males and females at Canadian universities. All find some discrimination (3% to 8%), a result in accord with published research on the same topic. However, the approaches taken are quite different, often reflecting controversial decisions over which variables would be included to explain salary differentials. We examine the strengths and weaknesses of these reports. In particular, the focus on single equation models is a problem since some of the controversial variables, which may be biased by discrimination, also contain some information which explains legitimate differences in salaries. Our review suggests that many of the models are probably misspecified. We conclude with a call for universities to collect the information which is required to complete these studies expeditiously and accurately.

Résumé

Cet article fait l'examen de cinq rapports portant sur l'équité salariale dans les universités canadiennes. Tous les rapports documentent l'existence d'écarts salariaux (entre 3 et 8%) qui reflètent les écarts généralement recensés dans les écrits sur le sujet. Cependant, ces résultats reposent sur des approches méthodologiques très différentes qui témoignent de décisions controversées ayant trait à la sélection des variables pouvant expliquer les écarts salariaux. L'étude analyse les forces et les faiblesses des approches

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utilisées. En particulier, le choix de modèles à une seule équation pose problème puisque certaines variables sélectionnées peuvent à la fois décrire des différences salariales discriminatoires et contenir de l'information permettant d'expliquer des écarts légitimes de salaires. Notre analyse suggère donc que plusieurs modèles ne permettent pas d'expliquer adéquatement les écarts salariaux et que les universités concernées devraient rapidement faire la collecte d'informations supplémentaires pertinentes pour compléter les études déjà réalisées.

INTRODUCTION

This paper is an evaluation of pay equity studies in Canadian universities. Pay equity is interpreted as the concern that faculty associations, administrators, and faculty members have with ensuring that females are paid equally to males with comparable qualifications and experiences. There appears to be a consensus among these various groups that pay equity is an important goal to be sought, and a priority among the competing demands for discretionary funds that are available.

A number of universities have attempted to identify the existence and size of the inequities in salaries between male and female faculty members. Studies from a few universities have been published, but the majority of studies have not, and they are often unavailable to other researchers. This is unfortunate since the unpublished studies reveal a great variation in how they estimate the size of pay inequities. In this paper, we examine five recent reports on pay equity from Canadian universities. In each study, the goal was the same, but the methods of calculating differences in salaries were different.

No doubt, it is reasonable to assume that legitimate differences in salaries can arise from differences among individuals and differences between groups. It is less clear what these legitimate differences are, and how they should be considered. On these two issues, the five reports vary considerably. Thus, we consider these reports in light of the published literature that evaluates the existence and magnitude of inequities in salaries. The published literature has shown that a number of factors other than gender (e.g., discipline, highest degrees, publications, and experience) explain some of the differences in salaries between male and female faculty members.

In the next section of this paper, the five reports are outlined, emphasizing the way the variables are measured and the way they are incorporated into the analytical models. In the third section, we analyse the reports and consider both their strengths and their weaknesses. This discussion focuses on the published literature and provides the framework for considering the five reports. Here, we also show that a number of value judgments have been made, and that people of good faith can often disagree on the adjustments that have been made in the salaries of particular faculty members. Finally, in the fourth section, we consider the implications of our analyses for future research on salary inequalities between male and female faculty members at Canadian universities.

FIVE REPORTS ON PAY EQUITY IN CANADIAN UNIVERSITIES

The five reports we review illustrate that there has been considerable effort to quantify inequalities in salaries between males and females at Canadian universities. The five reports vary in the approaches they have taken in estimating differences in salaries. The reports also vary in the variables that have been included and in the way that these variables have been measured. Nevertheless, there are a number of similarities between the reports. All the reports have been influenced by procedures outlined in a pay equity guide prepared for the Canadian Association of University Teachers (CAUT) by Allen (1984). In addition, all of the reports are based on multiple regression analyses. Finally, the quality of the research is more difficult to evaluate for internal reports than for published articles which have been subject to external review.

Concordia University (1991)

In 1989, Concordia University established a Joint Pay Equity Committee (JPEC). The JPEC recommended that multiple regression analyses should be used to assess differences in salaries between male and female academics. They advised that care should be taken in choosing the variables to include in the analyses and they quoted the CAUT report (Allen, 1984) that variables should satisfy three criteria before they should be included in the analyses. The variables should be credible; they should be legitimate determinants of salary; and they should not be correlated with discrimination. It was argued that the third criterion would exclude any variable that is plausibly affected by discrimination against females. As such, they decided that age was a legitimate variable but academic rank was not. The JPEC considered seniority to be the most important determinant of salaries and recommended the use of two seniority variables: maximum possible career length and minimum relevant career length. A variable was also included for the most appropriate terminal degree: Ph.D. in most faculties, and masters or professional degrees in others. After some discussion, the JPEC decided not to use productivity variables. As a test, however, they checked relationships between gender and special merit increases in every year since 1977. None of the correlations were statistically significant; thus the JPEC decided that special merit awards would not be used to explain differences in salaries between the genders. It was also argued that other productivity variables, publications and research grants received, for example, were not credible and consequently they were not included in the analyses. Only three variables, age, number of years since first full-time appointment, and highest degree (Ph.D. in most cases) were included in the analyses.

Three separate pairs of regression analyses were computed, one for each Faculty (Arts and Science, Commerce and Administration, and Fine Arts). Librarians were excluded from the analyses because of the small number of male librarians. The qualification variable was dropped from the regression for one faculty where the number of females was very small and all the females had Ph.D.s. Two regression analyses were examined for each of the three faculties, first to identify outliers, and second to assess gender differences when the outliers were excluded. In all analyses the number of outliers

was small and had relatively small effects on the results. The final equations for Arts and Science Faculty explained 76.9% of the variance for female salaries and 64.1% of the variance for male salaries. The final equations for Commerce and Administration explained 44.2% of the variance for female salaries and 52.7% of the variance for male salaries. Finally, the equations for the Faculty of Fine Arts explained 87.7% of the variance for female salaries and 85.9% of the variance for male salaries.

Following this, the male equations were used to predict female salaries. The differences between the predicted and the actual salaries for females were used as indicators of discrimination, and became the basis of adjustments that were made in the salaries of female academics. These calculations suggested that corrections were needed for 76 of 83 females in Arts and Science (X = $3,974), all ten females in the Faculty of Commerce and Administration (X = $6,340), and 8 of 29 females in the Faculty of Fine Arts (X = $1,932). Finally, the report recommended that analyses should be repeated in five years, presumably with better data, when further adjustments may be made.

Memorial University of Newfoundland (Schrank, 1985)

Memorial University of Newfoundland had two studies of differences in salaries between males and females. In 1973, Schrank (1977) conducted the first study and noted that female faculty members were paid between 4.0% and 4.5% less than comparable male faculty members. This study estimated 11 regression equations that included various combinations of the following variables: faculty and department, academic rank, age, age squared, years of service at Memorial, years of service squared, years in current academic rank, years in current academic rank squared, research grants held, the number of books published since joining the Memorial faculty, journal articles published, administrative positions held, qualifications held (masters and doctorate), leaves, initial salary, and a series of interactions between gender and most of the other variables.

As a result of this study, the administration paid $64,000 in adjustments to female faculty members (Schrank, 1985, p. 2). The faculty association assessed the adjustments and concluded that about one-half of the aggregated sex differences in salaries had been eliminated. In 1982, the president of Memorial agreed to support a second study using data gathered in 1982–83. This study was jointly sponsored by the administration of the university and the faculty association. Schrank was again commissioned to do this study, and with 3 assistants, gathered and coded the appropriate data over a 19 month period. At that time, 809 males and females (16.3%) held regular probationary and tenured appointments at Memorial University (Schrank, 1985).

Schrank (1985) identified 38 variables and groups of variables that should be included in the revised analyses. These variables and groups of variables included the following: academic discipline, department, faculty, sex, marital status, citizenship, year of birth, annual salary on appointment, 1982-83 salary, degrees, diplomas, years of university teaching, years of high school teaching, years of experience prior to becoming employed at Memorial, years of related experience, publications in journals, proceedings, and books,

administrative experience, year of appointment, academic rank at appointment, the year tenure was awarded, years of sabbatical leave, years of leave without pay, grants received, publications after receiving an appointment at Memorial, membership on Royal Commissions, journal editorships, consulting experience, and a variety of other variables.

Stepwise least squares regression analyses were used to estimate 26 equations. Gender had a main effect in only one equation, but it had interaction effects in a number of the other equations. Schrank interprets the gender interaction effects as illustrating that females have been subjected to discrimination, not as a result of their gender *per se,* but as a result of their gender in combination with other characteristics such as their age, the faculty in which they are employed (e.g., Physical Education), and highest degrees, specifically for females holding only a bachelor's degree. At the same time, females with a Masters degree but no Ph.D. and females employed at the regional campus in Corner Brook had higher salaries than comparable males (Schrank, 1985). Overall, Schrank suggested that the salary differential between females and males range between 1 and 4.6% of the average annual salaries of males.

Queen's University (1991)

Queen's most recent salary study (1991) was conducted by the Principal's Review Panel in response to provincial legislation on pay equity. As with all the other studies, this one also used multiple regression procedures to assess differences in salaries between male and female faculty members. This study is the only one that includes a variable reflecting the market conditions of different disciplines. In this respect, the committee noted that many salary decisions are determined by market-conditions that operate for faculty members in various departments and faculties; thus national market-conditions for the appropriate disciplines were incorporated into the analyses. The variable measuring market conditions was constructed from Statistics Canada calculations of average Canada-wide salaries for academics in age-specific discipline groups. Calculations were only conducted for the salaries of males, and these calculations were used to construct an index reflecting the national market conditions for each discipline for a variety of age groups.

In addition, this study is noteworthy for the effort the committee made at measuring experience. The committee constructed detailed guidelines on measuring experience and the Deans met to discuss these guidelines. This was to ensure that common university-wide procedures were followed. As a result, these guidelines were used by all Deans to assess each of their faculty members. The guidelines provided indicators for including non-university experience, teaching experiences that academics may have had in other institutions, and the time that academics may have had on reduced appointments. Age is not included in this study; presumably, the experience variable is a more relevant indicator of salary than age.

The issue of performance was also explicitly addressed in this study. Performance influences salary directly through merit awards and indirectly through promotion of academics to higher ranks. The Panel had been instructed to include academic rank as a

variable in explaining differences in salaries between males and females. They considered using rank as a variable in their regression analyses, but following the advice of Allen (1984) that there may be a gender bias in promotions, they decided that academic rank was not an appropriate variable to include. In responding to the report of the Panel, the Principal of Queen's University noted that an earlier study of promotions had traced the difference in promotion patterns by gender to, among other factors, decisions by some females to restrict their careers for family reasons. This would suggest that promotion rates may differ by gender, but this difference need not necessarily reflect discrimination by the university.

Individual faculty members at Queen's are given merit scores as part of their annual performance review, and the Panel noted a problem with using these merit rankings, similar to the problem with using academic rank. The Panel had a seven-year merit average score for each faculty member, and the Panel argued that differences in average salaries between the genders must have arisen from either differences in initial salaries or differences in merit increases. As a result, a subgroup of the committee argued that it would be inappropriate to include merit in the analyses. Since the Panel was divided on the issue, results were provided with and without the merit variable included.

Single equation analyses were used, with sex as one of several exogenous variables. The dependent variable is the natural logarithm of nominal, market-adjusted, annual salary for each academic at Queen's. Two models were presented, with and without the merit variable included. When the merit variable was excluded, four independent variables were used: number of years of experience, number of years of experience squared, department affiliation, and gender. This model explains 75% of the variation in salaries and the coefficient for gender was – 0.052, which suggests that, on average, females were paid about 5.2% less than comparable males. When the merit variable was included with the other variables and an interaction term representing the merit variable times the number of years experience, the model explains 84% of the variation in salaries and the coefficient for gender was – 0.035. This suggests that females were paid about 3.5% less than comparable males. The interaction variable was used because the increases in salaries that academics received varied significantly with their years of experience.

In addition, the relationship was examined between gender and the merit variable. This analysis showed that merit scores were approximately 5% lower for females than for males with comparable years of experience. The Panel notes that the merit process needs further examination. Over the last several years, average merit awards did not differ by gender, but the seven-year averages did differ significantly by gender. The Panel recommended further study of this issue.

Simon Fraser University (1991)

A preliminary study at Simon Fraser University was completed in 1991, and used a different methodology than the other studies. This study was based on a series of two and three variable cross-tabular analyses. A pilot study using multiple regression analysis was

discussed in the report, but no results from the regression analyses were presented. The pilot study recommended that the independent variables include publications, grants received, years since highest degree, experience, teaching ratings, and service ratings.

The Simon Fraser report begins by noting that before any variables were controlled, the average salary for females was 15% lower than the average salary for males. However, a number of factors can explain these differences, including differences between males and females in qualifications and experiences. As such, three independent variables were included in the analyses: qualifications, measured by whether a faculty member holds a Ph.D., market factors, and experience. Fewer females than males held doctorates (82.6% versus 91.7%) and faculty members, irrespective of their gender, were paid less, on average, if they did not have Ph.D.s.

Instead of including 'holding a Ph.D.' as a variable, the committee restricted its analysis to only the academics with doctorates. In addition, the committee attempted to adjust for differences in market conditions of different disciplines. First, it distinguished between market and non-market disciplines. Market disciplines include Engineering Science, Computing Science, Criminology, and Business. Presumably, there was a market value outside a university for academics in these disciplines. In market disciplines, average salaries were 7.6% lower for females than for males before other variables are controlled. In non-market disciplines, average salaries were 14.6% lower for females than for males. As noted previously, these differences apply only to faculty members who held doctorates, and thus correct for only one significant determinant of average salaries. Second, as an alternative procedure, the committee attempted to separate faculty members with and without market values in their salaries. The report did not indicate how these market values were determined. Nevertheless, after identifying faculty members according to this criterion, it was found that females with market value outside universities received, on average, 1.3% less in salaries than males, while for faculty members who did not have salaries that contain market values, females received, on average, 15.1% less than males.

Third, the study included a proxy for experience. Without actual data on experience, the number of years since being awarded a Ph.D. was used. Simple plots of nominal salaries across number of years since being awarded a Ph.D. indicated that experience was rewarded at a higher rate for males than for females, and as a result, differences in salaries between the genders increased with years of experience. The simple plots also suggested that females were paid more than males for the first few years of their employment. The study estimated salary differentials by estimating the average salaries for females using a cross-tabular analysis of nominal salaries of males by number of years since they were awarded Ph.D.s. Overall, these calculations suggested that females were paid 7.5% less than males if their salaries did not include market values, and 5.7% less if their salaries included market values.

The study also examined rank and noted that there is a significant difference in the salaries of males and females for full professors. At this level, the average salary for females

was approximately 10% lower than the average salary for males, although males had, on average, four more years of experience than females. All faculty members (except one) who were originally hired at the rank of full professor were males, and 50% of these people were hired before 1975 when Simon Fraser University was hiring full professors as Heads of Departments and Deans of Faculties. A variable measuring administrative responsibilities was not used in the analyses to explain differences in salaries between the genders.

At the assistant and associate academic ranks, the difference in salaries between males and females was less pronounced, and in some categories the average salary of females was higher than the average salary of males. However, the average female assistant professor had two years more of experience than the average male assistant professor. At Simon Fraser University, a greater proportion of female academics were at the assistant and associate levels than were at the full professor level. The different distribution of males and females, across ranks, explained some of the differences in their salaries. The report suggested that females were promoted more slowly than males, and if females had been promoted at the same rate as males, there would be five additional female associate professors and eight additional female full professors. The report noted that there was no significant difference in the salary progress increments by gender and that additional analyses were required to determine if the genders differed in their rates of promotion.

The committee also provided estimates of the differences in salaries for males and females at the levels of assistant and associate professors. Since not all academics at Simon Fraser University were hired directly after completing their Ph.D.s, an estimate was made of how much they were paid per year after they completed their Ph.D.s. The committee reasoned that the initial salary of academics is largely determined by the number of years of previous experience. Following this reasoning, males at the assistant professor level were paid $325 more than females for each year of experience they had, and at the associate professor level, males were paid $944 more than females for each year of experience.

University of Manitoba (1992)

The University of Manitoba report was completed in March, 1992, and used multiple regression analyses to assess differences in salaries for all male and female faculty members who belong to the University of Manitoba Faculty Association (UMFA). The gross average salary of females, $54,522, was substantially lower than the gross average salary of males, $71,551. However, the committee acknowledged that there were considerable differences between the genders that account for differences in salaries: females were considerably younger than males; they had less experience; and fewer of them had Ph.D.s. The committee attempted to control for these variables in the regression analyses, but no other variables were considered. In particular, rank was excluded because, as the committee argued, "it is an inappropriate factor to include since much of the discrimination between men and women must occur in promotions." For the same reason, the committee argued that starting salaries should be excluded; starting salaries are also likely to be tainted by discrimination.

The equations for females and males, incorporating age, experience, and highest degree, explained 53 and 65% of the variance in salaries respectively. The equations for both males and females were statistically significant. The committee recognized that including more variables would probably improve the explanatory power of the equations, but the committee did not have enough time and resources to collect additional information. In addition, the committee was only responsible for suggesting a way to allocate $100,000, a small proportion of the total amount they argued was needed to eliminate gender discrimination. A follow-up study was recommended.

On the basis of these three variables, the report provided estimates of the salaries that females would receive if they were comparable to males. Using this procedure, the committee estimated that discrimination against female faculty members was, on average, $4,791 per female faculty member, a difference that represented approximately 8.8% of the average salary of males.

Separate analyses were conducted for librarians, although the results were less satisfactory because there were many fewer librarians than professors. Age, experience, and highest degree explained 56% of the variance in salaries for female librarians and only 38% of the variance in salaries for male librarians. Using the equation for the males, the committee estimated that discrimination against females averaged $3,749 per female librarian.

All of these reports are important additions to the literature on salary discrimination. They represent attempts to address the issue and provide appropriate redress at the institution level. All five reports find some evidence for gender discrimination in salaries, although the specific approaches taken by the various committees were different. In this respect, they are consistent with the published literature, almost all of which finds evidence of salary discrimination against female faculty members. Furthermore, the size of the discrimination is in the range of the estimates that have been presented in the published literature. However, there are substantial differences in the approaches taken to estimate these results, and in the following section these approaches are considered more carefully to assess the strengths and weaknesses of the reports.

A CRITICAL EVALUATION OF THE REPORTS

In Canadian universities, unionization and the implementation of pay structures makes analyses of pay equity relatively easy. Initially, salaries are likely to vary because of differences in starting salaries, the progression of people through the ranks from lecturer or assistant professor to full professor, the time they spend in each rank, and their contribution in teaching, research, and service. Theoretically, at least, gender should not affect the salary structure of faculty members. Nevertheless, judgements are involved in many of the salary decisions that people make, and judgments may be influenced by discriminatory attitudes. Consequently, the discussion over how to estimate differences between the salaries of males and females is complicated by argument over whether the explanatory variables are themselves biased as a result of discrimination.

However, there are several legitimate reasons why initial salaries might vary, such as the department to which the academic has been appointed and the productive resources the individual brings to the department, including research grants, published articles and books, teaching competencies, and service to the community. Of course, gender is not one of these variables, and should not be used, even inadvertently, in determining salary. Even though gross differences exist, male and female academics may differ on variables other than gender, that may legitimately affect their salaries. As a result, their average salaries may not be the same.

Experience and Seniority

Experience directly affects salaries. Salaries rise, often in a non-linear fashion, the longer an academic is employed in a university (Barbezat & Hughes, 1990). If experience varies by gender, then part of the differences in salaries between males and females may be explained by differences in experience. Swartzman, Seligman, and McClelland (1992), for example, showed that after allowing for differences in the time that had passed since an academic was appointed as an Assistant Professor, female salaries rose from 87% to 94% of males salaries. In other words, when experience was included, the difference in average salaries between male and female academics was reduced from 13% to 6%. So, the differences in experience between males and females may partly account for differences in salaries.

All five studies agreed that faculty members receive higher salaries as a result of their experience and seniority. There is, however, remarkable divergence in the ways that experience and seniority are assessed and the ways that they are included in the analyses. Three of the studies do not have data on the actual experiences of faculty members; they use proxy variables. The procedures used in these studies are not completely satisfactory. The committee at the University of Manitoba, for example, used two proxy variables as indicators of experience, age, and the number of years since faculty members received their final degrees. In doing this, they were following the CAUT report by Allen (1984), suggesting that while both of these variables contain gender biases, the biases offset each other. In other words, Allen (1984) claimed that age was probably biased in one direction because female faculty members tend to begin their academic careers later than males, while, for the same reason, number of years since receiving a final degree was biased in the opposite direction. Allen provided no empirical support for this argument. We know from other reports that these variables may be highly correlated with each other, making it difficult to determine the contribution of each variable to the explanation of salaries. This may be a problem if males and females differ on these variables, and the male equation is being used to predict the female salaries. Schrank (1977) reports that age, year of first degree, and year of last degree were so highly correlated that only one of these variables should be used to represent experience. In this respect, the studies do not provide information on the correlation between the proxies for experience; thus it is impossible to know if this is a problem.

The study conducted at Concordia University also included two experience variables, age and years since first full-time appointment. The reasoning of the committee was that age was a predictor of maximum possible career length while years since first full-time appointment was a predictor of minimum relevant career length. These two variables may be highly correlated and, as a result, they may suffer from the same problem as the two variables chosen by the committee at the University of Manitoba even though the variables are not the same. The category of years since first appointment is different from the category of number of years since the final degree, and the former essentially amounts to a measure of experience accumulated at the university where an academic is presently employed. The researchers for Concordia noted that their study was problematical because they did not have data on faculty-members' experience before their employment at Concordia; however, they did not attempt to solve this problem. Instead, they noted the difficulty in collecting the additional data. This is unfortunate. Having recognized that experience is probably the most important determinant of salary, and having also recognized that the existing measures of experience are inadequate, the Committee might have recommended that the university collect accurate information on the experiences academics had before their employment at Concordia. The study concluded with a general recommendation that better data should be collected before a follow-up study is undertaken.

In this regard, the studies at both Memorial and Queen's universities are noteworthy. Besides measuring the actual experiences that academics have had since joining Memorial University, Schrank's (1985) study included a large number of variables measuring prior experiences, including measures of prior teaching experience at both university and schools and the publications that academics had completed or published before joining the university. Each of these measures was entered as a single independent variable, resulting in a very large number of variables in the analyses. Undoubtedly, creating composite variables would have resulted in a better measure of prior experience. Nevertheless, several of the measures of prior experiences, including teaching experiences at other universities, experiences as sessional or part-time faculty members, and the time faculty members spent in related but non-teaching appointments, were significantly related to the salaries that Memorial University faculty members received. More significantly, the separate analyses for males and females indicated that there were gender differences in the effects of these variables on salaries (Schrank, 1985). This suggests that a more complete understanding of salary differences would result if variables that measure a great variety of the experiences were included in the analyses. In addition, this finding suggests that if these variables are not included in the analyses, the model is likely to be misspecified, and biased estimates of discrimination are likely to result.

The study at Queen's University is also noteworthy because it included a single composite variable for experience, constructed from each type of prior experience. A composite variable incorporates an explicit judgment about prior experience, and if these judgments are tainted by discrimination, the analyses are unlikely to identify gender bias in salaries. This is because the differences between males and females will be accounted for

by the experience variable, which in this case would be a tainted measure. Unfortunately, we do not know if this is a problem with their procedures. Nevertheless, if this procedure of measuring experience is fair, it ensures consistent weighting of prior experience for both males and females. In addition, if the experience variable is fair for both males and females, and if it is included in the analysis, it would help in estimating gender discrimination that is independent of prior experience.

The detailed guidelines provided to Deans to assess the prior experiences of faculty members indicate the difficulty they had in assessing the variety of experiences that academics have which may be related to both their gender and their salaries. The considerable effort of the committee to define and measure relevant prior experiences need not be repeated in future studies; the data exist for present faculty members. A single variable measuring prior experience is much easier to understand and interpret than the large number of variables that were used in the Memorial University study. Furthermore, the guidelines that have been developed to measure these variables can be used to update the data set and to ensure that new faculty members are treated fairly. Other universities could benefit from using a similar strategy for measuring the prior experiences of their faculty members.

A final problem with the experience variable is that, no matter how it is measured, it is likely to be non-linear; university salary structures tend to flatten out at the top of the experience scale. In other words, the financial returns for experience decline over an academic career. In this respect, the study at Memorial University showed that the non-linear age variable, as a proxy for experience, was an important indicator of gender discrimination. The study at the University of Manitoba also included non-linear terms for both experience variables, age, and years since completing final degree. Nevertheless, the studies from Concordia University and Queen's University do not include non-linear terms for experience. A graphical representation of the relationship between experience and salary is presented in the Simon Fraser University study, but the analysis does not include a non-linear term. In these studies, there are no arguments presented to support the assumption that experience should be measured as a non-linear variable even though considerable evidence from the literature suggests that this is the case. There is, however, more to the relationship between salaries and experience than longevity alone.

Administrative Experience

An additional factor, that is related to experience, is whether an academic has held an administrative position. Experience as an administrator tends to increase the salaries of academics (Becker & Goodman, 1991). Again, there are significant differences between the genders on this variable. As readers may expect, the percentage of females who have administrative experience is much smaller than the percentage of males. We are not arguing that the appointment of academic administrators is or is not biased. Our point is that even if universities increase the percentage of females who currently hold administrative positions, there will still exist an effect of past administrative experiences on salaries.

In the past, administrators often received permanent increases in their salaries. Some researchers point out that the unequal representation of females in administrative positions is a result of discrimination. Consequently, these researchers often argue that administrative experience should not be included as an explanation of differences in average salaries between academics. Even if discrimination can help explain differences between male and female academics in their administrative experiences, it is not the only variables that may explain such differences. Researchers cannot disregard the possibility that administrative appointments may also result from an academic's interest in administrative work. As a result, attributing all the differences in administrative experience to discrimination may overstate the case. Whether it does so is an empirical issue. The published literature presents conflicting results. Barbezat and Hughes (1990) include administrative experience and estimate gender discrimination at 6.7%, while Raymond, Sesnowitz and Williams (1990) exclude it and estimate gender discrimination at 3%. The five Canadian reports differ in the way that administrative experience is treated. The report from Memorial University is the only one that incorporates administrative experience into the analyses, and it shows that administrative experience had a positive impact on salaries.

In recent years, it has been common for administrative stipends to be relinquished when the appointments are concluded. Consequently, the gender bias resulting from administrative experiences is between faculty who held administrative positions some years ago and both male and female academics who never held such positions. Unless a variable measuring administrative experience is included in the analyses, those who never held administrative positions will appear to be underpaid. In most cases, this will include virtually all females but it will also include a substantial number of males, particularly younger males. If a variable that measures administrative experience is not included in the analyses, then the average salary of males is increased. This results because a number of highly paid males who previously held administrative positions have been included with other males who have never held administrative positions and have relatively lower salaries. Thus, by not including a variable that measures administrative experience in their analyses, researchers ensure that the effects of gender will be larger than would otherwise be the case.

This problem can be addressed by excluding academics who have been administrators from the analyses. This procedure is recommended by Becker and Goodman (1991), and is an appropriate procedure when there are relatively few of these academics and when they are overpaid relative to other academics with similar characteristics.

Qualifications

Qualifications also affect salaries, particularly initial salaries. Formby, Gunther and Sakano (1993) showed that the presence of an appropriate highest degree can affect salary between 4 and 7%. The presence or absence of a Ph.D., as the highest degree, is also significant (Becker & Goodman, 1991). After controlling for the presence of an appropriate final degree, as well as a number of demographic, productivity, and university characteristics,

Formby, et al. (1993) concluded that there were no differences in the beginning salaries of male and female academics. Even if it is generally true that initial salaries are equal for equally qualified males and females, this does not mean that current salary structures are free of gender discrimination. It does suggest, however, that discrimination may apply to females who were hired some years ago and not necessarily to females who have been hired recently.

Of the five studies we reviewed, only the Queen's University study did not include a variable reflecting differences in the qualifications of faculty members. No reasons were given for this decision; it may be that virtually all academics at Queen's had relevant qualifications. In other words, there may have been too little variation for the qualifications variable to add anything to the analysis. At Simon Fraser University, on the other hand, there was a significant difference in the proportion of female faculty members with completed doctorates (82.6%) in comparison with males (91.7%). As a result, the committee at Simon Fraser limited their analysis to those academics with completed doctorates. This procedure reduced the unexplained difference in salaries between genders by approximately 12%. In other words, about 12% of the differences in salaries between males and females could be explained by differences in qualifications.

The other three studies all included a qualification variable. Qualifications can vary across a number of dimensions, including the number of degrees, their level, and their type, which may differ across disciplines. The University of Manitoba included a dummy variable for whether faculty members had completed Ph.D.s. This procedure is adequate for many disciplines, but in some professional schools, professional qualifications and not Ph.D.s are the highest appropriate qualifications. The studies at both Concordia University and Memorial University included measures of qualifications besides whether academics held a Ph.D. The committee at Concordia identified the most appropriate qualification for each faculty member in each discipline, and included this as a dummy variable. The researchers at Memorial identified a number of qualification variables, including Bachelor's, Master's, Doctorates, and professional qualifications for Engineers and Medical Doctors. Unfortunately, no attempt was made to identify whether the qualifications were appropriate for the discipline in which the faculty member worked. Consequently, the results of the analyses are often confusing. The results of one analysis, for example, suggest that females, who have Bachelor's degrees as their highest qualifications, are underpaid compared to other faculty members. In another analysis no effect of discrimination is observed for females who only hold Bachelors' degrees. Overall, we think the Memorial University study attempted to measure too many variables with too much detail, which can often result in estimated effects that are not consistent across a number of similar analyses.

Universities usually have information on the appropriate qualifications of their faculty members. Curriculum vitae for each faculty member, containing individual qualifications, is filed with the Deans of the various Faculties, and the Deans could easily designate the appropriate highest degree for the discipline within which each faculty member works. It may require time and effort to compile the information on each faculty member,

but qualifications are an important determinant of salaries, and qualifications need to be included in analyses of differences in salaries.

Market Variables

One important difference in salaries can be noted in the disciplines in which males and females are hired. Market conditions, external to the university, affect salaries for different disciplines. Differences in these market conditions can affect the overall measure of salary differences among comparable individuals. For example, higher salaries for females in some disciplines, such as education, will partly offset lower salaries in other disciplines, such as health, making differences in salaries appear inappropriately small. The reverse can also occur. The point is that differences in salaries between comparably qualified males and females will be biased unless differences in market conditions are included in the analysis.

Four of the five studies included variables that measured market differences in the salaries of academics. The University of Manitoba study was the only exception, and the committee did not present any reasons for omitting this variable. There are a number of ways that market values can be measured, including using a number of variables representing different disciplines (see Guppy, 1989), using average salaries in comparable institutions for comparable ranks and tenure (Becker & Goodman, 1991), and using average departmental salary (Swartzman et al., 1992). All of these are ways of coding market variability for different disciplines. Not surprisingly, the four studies that used market value as a variable, used different ways of estimating its effect.

The committee at Concordia University estimated separate equations for different faculties, a procedure that ensures that differences in the market condition for different faculties are not attributed to gender. The researchers at Memorial University used a procedure similar to Guppy's (1989), but the variable is measured with considerably more detail. The advantage of the procedures used at Memorial is that it allows the researchers to examine gender differences by faculty, and the empirical results show that there were substantial differences in the salaries of comparable males and females in one faculty. This procedure recognizes that gender discrimination may not be prevalent in all departments and faculties, but it may be specific to certain departments and faculties. The study at Simon Fraser University divided the departments into market and non-market disciplines, a definition that may be useful internally but is less meaningful to outside observers. As an alternative procedure, the committee divided faculty members into two groups, regardless of their disciplines: those who had salaries that contained a market differential, and those who did not. Again, there is no discussion of how market values were determined. This is unfortunate because the variable assessing market differentials was a significant factor in explaining differences in average salary by gender. For faculty members with a market value included in their salaries, males were paid, on average, 1.3% more than females, while for faculty without a market value, males were paid, on average, 15.1% more than females. These results may suggest that competition constrains organizations

from discriminating against females, or it may suggest that other unrelated factors account for the differences between the salaries of males and females who have little market value outside the university system.

The committee at Queen's University made considerable effort to include market differentials by discipline and by age. The salary data, for both females and males, were adjusted for market differences, using average national salaries for males with specific age and discipline configurations. This is an excellent procedure since it recognizes that labour markets are considerably more complicated than discipline markets. The data were calculated by Statistics Canada on a cost recovery basis. Other universities could follow a similar procedure. The available studies suggest that a market variable is an important factor in explaining salary differentials. It is possible to include such a variable, and doing so would increase our confidence in the estimates that they provide of gender discrimination.

Productivity Variables

Productivity also influences salaries and individual academics differ in their productive contribution to universities. Academics are expected to conduct research and engage in scholarly activities, teach, and provide voluntary service to their university and to society. Furthermore, these components of productivity are included in the collective agreements between faculty associations and universities, and they are the basis for evaluating faculty members for tenure and promotion.

Research and scholarly productivity are usually measured by the number of books and articles an academic has published as well as by the number, and value, of research grants that have been obtained. Citations have also been used as a measure of the quality of academic research (Hamermesh, Johnson, & Weisbrod, 1982; Long, Allison, & McGinnis, 1993). The analyses of differences in salaries for academics indicate that research and scholarly productivity results in higher salaries (Barbezat & Hughes, 1990; Hamermesh et al., 1982; Raymond et al., 1990). In this respect, there is evidence that the type of research and scholarship that academics publish varies by gender (Broder, 1993). In addition, there is also evidence that research and scholarly publications are rewarded differently for males and females (Barbezat & Hughes, 1990; Weiler, 1990). Because academics differ in research and scholarly productivity, and because virtually all collective agreements acknowledge that this is a major determinant of promotion, it must be included in analyses of differential salaries for males and females.

It is more difficult to measure the contributions that academics make to teaching and service than their contributions to research and scholarship. Some studies have included the number and value of instructional grants as an indicator of teaching ability (see Raymond et al., 1990), but this a rather inexact measure especially since relatively few people have received instructional grants. Nevertheless, we have argued that teaching and service are both important determinants of tenure, promotion, and salaries. Consequently, it is necessary to include measures of these variables in assessing differences in salaries between male and female academics.

Surprisingly, only the reports from Memorial University and Queen's University included measures of research productivity. At Queen's, the argument about including a productivity variable was a dissenting opinion by a minority of the committee. The report at Memorial included measures of journal articles and books published, conference papers, reviews and abstracts, as well as artistic works. The number and amounts of research grants that faculty members received were also included. There were even separate variables to identify faculty who received professional recognition such as appointment as members of a Royal Commission or the Royal Society, as journal editors, or to government boards. If anything, there is such an abundance of variables that there may be little variation in some of them. In this case, it may have been better to create composite variables measuring productivity. Nevertheless, none of the variables that measured the recognition academics received (e.g., appointment to a Royal Commission) had significant effects on salaries, but several of the publication variables made significant contributions to salaries. These analyses show that research and scholarly productivity is an important determinant of salary.

The Queen's University study raises a different issue. The inclusion of a productivity variable increased the explained variance from 75% to 84%. This indicated that actual productivity rankings are a significant factor in explaining observed differences in salaries. Some of these differences were appropriate, but the majority opinion in the report argued that inappropriate salary differences must be due, in part, to differences in annual merit awards. The majority argue that this makes it difficult to justify using merit awards as a proxy for research and scholarly performance. Part of the problem may be that the productivity variable used by the committee was the same variable that was used, year-by-year, for merit increases. Presumably, research and scholarly performance affect salaries, and the dispute is over how to measure scholarly performance and how to include it in analysis of the relationship between gender and salary. The committee recognized this by recommending salary adjustments to female faculty members that are the average (4.35%) of the estimated discrimination with (3.5%) and without (5.2%) the productivity variable included the analysis. The measure of merit used at Queen's University is a subjective measure of merit that reflects the evaluator's (usually a Dean's) assessment of the faculty member's contribution, summarizing the objective measures of research and scholarly performance and the more subjective estimates of other contributions. A summary subjective measure, however, may contain a gender discrimination component, and that part should be properly attributed to gender itself.

One alternative procedure is to use a limited set of objective measures of research and scholarly performances in the analyses. Presumably, decisions on publications and research grants are made outside the university, and consequently they do not reflect discrimination by the institution itself. Measures of teaching performances and evaluations of service may be available or relatively easily constructed. It fact, some of the ambivalence that the various committees had about the productivity variables may have more to do with research and scholarly productivity, which have been easier to measure objectively, than with teaching.

and service, which have been more difficult to measure objectively. If females are better teachers and make greater contributions to service than males, as some literature suggests, then limiting the assessment of productivity to objective measures of research and scholarly performances may unduly bias the results in favour of males.

In the face of this difficult problem, Simon Fraser University recommended a pilot project using a four-point scale for measuring research and scholarship, teaching, and service. The criticism of this procedure is that the assessments are still subjective, and may be based, to some degree, on gender discrimination. However, this approach is probably better than not including assessments of these variables in the analyses. In fact, the literature suggests that including performance variables decreases the estimate effects of discrimination against female faculty members by as much as one-third (Barbezat, 1987). As such, analyses of gender discrimination that do not include measures of productivity are probably misspecified.

Academic Ranks

The category of academic rank pertains to professorial rank and the effect this has on salaries. Academic rank influences salary directly and females are not evenly distributed throughout the professorial ranks. Females represent only 12% of the professors who are older than 50 years of age, and they represent 28% of the professors who are under 40 years of age (Statistics Canada, #81-241, Table 7). There is a relatively slow turnover among university professors, and full professors, who were often hired more than twenty-five years ago, are much more likely to be males than females. Because salary is directly related to academic rank, and rank, in turn, is related to the time professors have been employed, the average salary of females is generally lower than the average salary of males (Statistics Canada, #81-241, Table 7).

In studies of academic salaries, rank is a consistent and positive explanatory variable. In the traditional single equation approach to estimating gender discrimination, rank may be a biased variable, in that gender may be one of the factors that explain rank. A separate equation predicting rank may be more appropriate if the biasing effect of rank is to be controlled. Some recent studies include separate equations for rank. Weiler (1990), for example, found that even after allowing for a number of variables measuring experience, market, research, and qualifications, the rank distribution for females is lower than would be expected. Broder (1993) employs a similar procedure but found that the average female had a salary that is slightly, but not statistically significant, lower than the average male. The implication is that including rank in the analyses of salary differences may mask a portion of salary discrimination. Weiler (1990) suggests a procedure for decomposing the contribution discrimination has on rank and including it as an unbiased measure of differences in salaries between males and females. As with salaries, rank is not solely determined by gender; variables measuring merit also count. These indicators may be included directly through productivity variables or indirectly through the rank variable. If both types of variables are excluded, then variables that are known to be significant determinants of salaries

are excluded from the model, and the results are probably biased. Barbezat (1987) found that including either rank or publications reduced the estimate of discrimination by approximately one-third. In essence, excluding rank from the model because it may be biased is not adequate.

One alternative to omitting rank entirely is to test whether the predicted promotion rate for females is the same as the predicted rate for males. This is the procedure followed by Swartzman et al. (1992) at the University of Western Ontario. These researchers predicted rank using age, highest degree, years since highest degree, years since first appointed as an assistant professor, and the average departmental salary as a control for market variation. They discovered that both females and males were equally likely to be promoted to the rank of associate professor. Having established that rank was not tainted by discrimination, these researchers incorporated rank into the analyses of salary differentials between males and females. They found that it is the third most important variable in explaining the variation in salaries. Specifically, the three most important variables included, years since first appointed as an assistant professor, average department salary, and rank.

The five reports reviewed in this paper differed in their treatment of rank. Rank was included in the study at Memorial University (Schrank, 1985), but excluded at the other four universities. Schrank had provided a detailed examination of the factors that predict rank in a number of equations, and gender was an important variable. Females with modest research output were more likely than comparable males to be promoted to the rank of associate professor, but they were less likely than males to be promoted to full professor, especially if they were research stars with substantial publications. In other words, Schrank (1985) showed that discrimination resulted from the interaction of gender, rank, and productivity. Overall, Schrank (1985) suggested that excluding rank and initial salary, gender discrimination was about 4.8%, whereas including rank along with these other variables reduced the effect of discrimination to about 3.8 %.

Unfortunately, the other reports have not included rank because the committees accepted Allen's (1984) suggestion that it is tainted by gender discrimination. As a result, compensating females on the basis of analysis that excludes rank essentially amounts to paying the hypothetical average female as if she had been promoted at the same rate as the hypothetical average male. If females have been inappropriately denied promotion, and this is not addressed, then when the study is repeated in the future (as many of the reports recommend), gender discrimination will again appear in the salary structure even if considerable money had been spent on adjusting the salaries. If universities continually make salary adjustments without considering rank, then they compensate female faculty members as if they had attained a higher rank, but without the other advantages of promotion.

Model Significance

Now that the five studies have been reviewed, we can ask: How well have the models in these reports explained differences in salaries between male and female faculty members at their respective universities? The answer to this question is important because

discrimination is not measured directly but is estimated using residuals where discrimination is assumed to be the difference in the salaries of males and females that have not been explained by the variables included in the analyses. In other words, none of these studies have direct measures of discrimination, but are estimating the effects of discrimination from residual differences after other relevant variables have been controlled. As a result, the estimates of discrimination may be biased if all other relevant variables have not been controlled. This specification bias could be in either direction, but in four of the studies we review (the exception is Memorial University) the bias is probably upward. The implication is that estimates of discrimination which use this procedure probably represent upper bound estimates of the discrimination in salary structures. In other words, when relevant variables are omitted from the models, the estimates of discrimination are likely higher than they would be if these relevant variables were included in the analyses. On this ground, there is value in the approach used at Memorial University of including every conceivable variable that may explain variation in salaries and then interpreting the trends in the residuals that indicate the gender discrimination that might exist.

The five reports do reasonably well at explaining overall salary variation, particularly since they have had to deal with the problems outlined above. The report from Memorial University explained more than 90% of the variation in all salaries, and similar results were obtained for the variation in salaries for males and females separately when rank was included as a variable. Without including rank and initial salary in the equations, the explained variance in present salary dropped substantially to about 73%. The study from Queen's University explained 75% of the variance in salaries with the merit variable excluded and 84% when the merit variable was included. The study from Concordia University explained between 86% and 88% of the variance in salaries in one small Faculty but only between 64% and 77% of the variance in salaries for males and females in the Faculty of Arts and Science where most of the faculty members were employed. The study at the University of Manitoba explained only 65% of the variation in the salaries of male faculty members and 53% of the variation in the salaries of female faculty members. Memorial University and Queen's University explained more of the overall variation than Concordia University and the University of Manitoba. The increase in explained variance in salaries at Queen's University was probably the result of the particular care with which the researchers defined and measured the productivity variables. This suggests that the results for Manitoba and Concordia would be improved if they included productivity variables in their models, and consequently the differences between males and females would be reduced.

To this point, we have identified a number of variables as possible determinants of differences in salaries between males and females. Even so, there are likely to be a number of specific factors corresponding to the special circumstances of different people that affect their salaries. If these factors are essentially random, they could be called luck, and they will have no effect on estimating differences in salaries between males and females. Some faculty members are more or less lucky than others; they have different salaries than

others with similar objective characteristics, and only a case by case examination might disclose the unique factors involved. Consequently, no model will completely explain all the observed variation in existing salaries. However, the studies should explain enough of the variation that other variables that have been omitted do not bias the results.

Almost all variables used in these studies may be tainted by discrimination. Nevertheless, this need not prevent researchers from including measures of these variables. If the variables are tainted, the bias in the analysis that is introduced by including them may even be less than the bias in the analysis that results from their exclusion. This results because there are two factors involved: a bias introduced among individuals who are otherwise similarly qualified, but differ on this variable, and a bias resulting from gender.

CONCLUSION

The issue of salary discrimination on the basis of gender is important and universities are beginning to address this. Universities have traditionally been in the vanguard of progressive thought; and thus it is expected that they would be active in attempting to ensure that their salary structures are fairly applied to all faculty members. All five reports provided estimates of gender discrimination in their salary structures. The range of discrimination in salaries was from 3% to 8%, which represents a substantial amount of money when it is translated into the actual cost to the university and to individual faculty members. The lower estimates of discrimination come from studies that have included variables measuring productivity while the higher estimates come from studies that have not included variables measuring productivity. Considering that productivity measures are included in the collective agreements of all five of these universities, and are the basis for tenure and promotion decisions, the models are probably misspecified if they do not include measures of productivity. This probably results in higher estimates of the effects of discrimination than would be the case if productivity measures were included in the models.

Nevertheless, universities will require substantial financial commitments to compensate individuals who have suffered discrimination. If universities decide not to include productivity variables in the model or if they decide to compensate everyone, males and females, who have suffered discrimination, then the compensation will be higher than if they decide to include productivity variables and to compensate only female academics. In any event, the sooner the corrections are made, the cheaper it will be for the universities to eliminate inequities. Shrank noted (1985, p. 67) that payments made after his 1973-74 study permanently corrected the inequities for the females who received payments.

In addition, the studies at Queen's and Memorial universities had considerable success in measuring appropriate productivity variables and estimating the cost of discrimination against female faculty members. The study at Memorial University was particularly noteworthy for the way the variables were measured and the number of variables included in the analyses. These variables were explicitly designed to incorporate much of

the unique circumstances that apply to a diverse faculty. This is the reason that the study at Memorial University explained the highest percentage of the variation in salaries of any study we surveyed. The study at Queen's University is also noteworthy for the effort the researchers made to incorporate market conditions, measuring experience along a variety of dimensions, and the way merit was included in the analyses.

Without detracting from the intent of the other studies to address these issues as fairly as possible, they have been less successful in addressing some of these fundamental issues. The study at Simon Fraser University concluded with an excellent proposal for collecting better data and for further research, but it had inadequate documentation of the current research. The study at the University of Manitoba appeared to have followed the advice of CAUT (Allen, 1984) so closely that the model was probably misspecified. The research at Concordia University could be improved by developing measures of experience that reflect those items that were included in the collective agreement. In addition, it is unlikely that the salary structure at Concordia contained as much random variation as the results of the present study indicated.

There is a substantial amount of published research on pay equity. Consequently, it might be expected that a greater consensus would have emerged on how to conduct pay equity research in universities. In particular, it might be expected that universities would have developed and implemented procedures to measure the necessary variables accurately. At Queen's and Memorial universities, considerable effort was made in measuring the appropriate variables, although the approaches were quite different. At the other three universities, however, this has not yet been done. Perhaps the single most important recommendation to universities is to begin defining the relevant variables, measuring the variables properly, collecting the information, and estimating models that will give reasonable estimates of gender discrimination. It is ironic that some universities have not followed such procedures since these are the procedures that are the basis of good empirical research, an issue that universities are particularly concerned about. In addition, the issue is urgent; gender discrimination is a very important political issue in universities. This urgency can lead to inadequate measures of the amount of salary discrimination and to over-compensation of some people, an action likely to make other people, who are equally deserving, unhappy. Universities need to address this problem now. Delays in gathering the appropriate information result, ultimately, in delays in compensating those academics who deserve compensation.

At present, there appears to be some consensus developing in the published literature about how to conduct pay equity research. It is necessary, for example, to include whether academics are tenured and/or promoted, as these variables are defined in the various collective agreements. In addition, it is important to include more than two or three independent variables. Furthermore, there now seems to be a consensus to use multiple regression analyses as the appropriate research methodology. Moreover, the research literature suggests that single equation models, that are still widely used by researchers and adopted by most of the studies we have reviewed, are probably inadequate.

The diversity of the methodological procedures used in these five studies is a credit to the creativity of the committees, but it is a disservice to the scientific integrity of the procedures and the issue. It may be appropriate for a national organization, such as CAUT and AAUC, to take up the challenge and outline the procedures that should be used in both assessing and compensating those who have suffered from discrimination. Additionally, more reports of gender discrimination can be submitted to journals for publication, ensuring that universities apply the same criteria to their own issues that academic faculty apply to their own research.

Our criticisms should not be taken to imply that no discrimination exists. All the studies find that some discrimination exists, and this is consistent with the published literature. Furthermore, the estimates are in the range of the estimates that have been published in research journals. Our critique should be interpreted as a call for more care in conducting these studies. Estimates that are as accurate as possible ensure that compensation accrues to those who truly deserve it, and that the procedures and the outcomes have wide acceptance in the university community.

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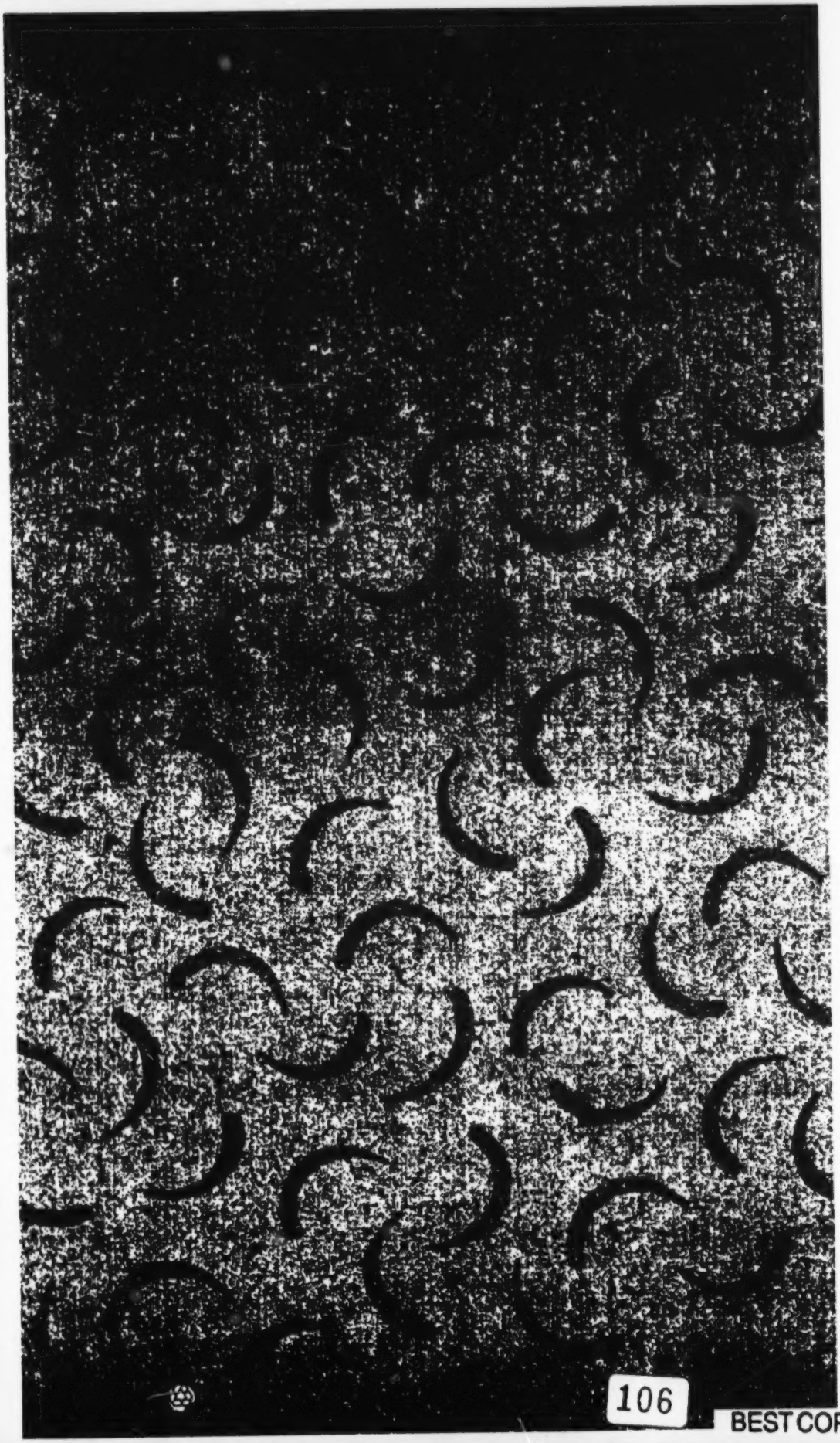

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